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UTILIZATION OF ACUTE CARE HOSPITAL SERVICES BY PSYCHIATRIC PATIENTS IN ALBERTA

©

by

SANDY ALLEN

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF HEALTH SERVICES ADMINISTRATION

DEPARTMENT OF HEALTH SERVICES ADMINISTRATION AND
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SPRING, 1986

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled UTILIZATION OF ACUTE CARE HOSPITAL SERVICES BY PSYCHIATRIC PATIENTS IN ALBERTA submitted by SANDY ALLEN in partial fulfillment of the requirements for the degree of MASTER OF HEALTH SERVICES ADMINISTRATION.

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ABSTRACT

Since the early 1960s, the deinstitutionalization of psychiatric patients from mental hospitals, and the continuing emphasis placed on the provision of mental health care services in community-based facilities, has focused attention on the changing care needs of the mentally ill. In response to these changing care needs, and the need to provide high quality health care in a cost-efficient manner, several provincial mental health service systems are undergoing a process of reorganization. In Alberta, regional mental health care planning committees were recently established to examine approaches for developing a comprehensive and coordinated regionalized mental health care system. Such planning endeavours require a substantial amount of information to assist in rational decision-making. The present investigation of provincial and regional general hospital utilization patterns by the mentally ill in Alberta was undertaken to supplement these planning information needs.

General hospital utilization data derived from PAS separation abstracts for the years 1971 to 1982/83, census population data obtained for the years 1971, 1976 and 1981, and population estimates for the intercensal years formed the major part of the data base for this investigation. The overall research strategy focused on providing a description of psychiatric utilization patterns and per capita utilization rates over time at a provincial and regional level. Several analyses examined service-specific utilization patterns and rates by bed type (hospitals/districts with psychiatric beds versus hospitals/districts with only medical beds), diagnosis and gender. Regional patient origin-destination patterns were examined from both a community-based and provider-based perspective.

The major findings of this investigation included the following:

1) General hospital utilization rates per 10,000 persons, 15 years of age and older, for all psychiatric disorders tended to decline during the course of the study period.

2) The proportion of separations from hospitals with psychiatric beds and hospitals with medical beds only tended to be approximately equivalent over the 12 year study period. Patient days in hospitals with psychiatric beds, however, tended to be two to three times higher than in hospitals with medical beds only.

3) On an age-sex adjusted per capita basis, residents of the Edmonton and Calgary mental health care regions utilized the fewest hospital resources for psychiatric disorders; residents of the Fort McMurray region tended to utilize the greatest amount of hospital resources for psychiatric disorders.

4) Most persons who required general hospital care for psychiatric disorders tended to remain in their hospital district of residence, irrespective of their diagnosis or the type of care available in their district or region (psychiatric beds versus medical beds only).

5) Residents of the majority of hospital districts in the Fort McMurray region received between 21% and 50% of their psychiatric hospital care, in terms of patient days, in Edmonton district hospitals.

On the basis of the results of the descriptive analyses, recommendations were made with respect to future research and planning strategies.

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CHAPTER I

INTRODUCTION

One of the most significant changes in treating the mentally ill over the past two decades has been the shift from the mental hospital as the principal locus of care to community-based facilities. This change in treatment philosophy and practice was strongly influenced by the advent of psychotropic medications and the belief that normalization of the mentally ill could best be achieved in the community rather than in isolated institutions.

In response to the changing medical and social service needs of the mentally ill, and the need to provide high quality health care in a cost-effective manner, several provincial delivery systems for mental health services in Canada have been undergoing a process of reorganization. In Alberta, recognition of these needs has resulted in the current effort to establish a province-wide plan for the redevelopment of the mental health care system. Long-range planning for the intended functions of health care services, however, requires an understanding of their past and present role and functions. This longitudinal study of selected aspects of general hospital utilization, as one component of the mental health delivery system, is intended to supplement the information needed for rational planning and decision-making.

1.1 Statement of the Problem

Over the past 25 years, numerous patients have been deinstitutionalized from mental hospitals in Canada as a result of successful treatments with psychoactive medications and emerging psychotherapeutic techniques. At the same time, the provision of community-based care for the mentally ill was stressed as being an important factor in their reintegration into normalized roles and relationships (Frumkin, 1982). The simultaneous rise of the community psychiatry and deinstitutionalization movements in Canada during the 1960s prompted the Canadian Psychiatric Association (CPA) to pass the resolution that all general hospitals over 200 beds should have inpatient psychiatric units in order to provide comprehensive health care to the communities they serve (McKerracher & Smith, 1964.) In addition, the CPA asserted that psychiatric units should attempt to provide service to all types of psychiatric patients and to assume responsibility for their long-term care (1964).

Current Federal guidelines for adult psychiatric services (Health & Welfare Canada, 1979), recommend that all general hospitals should admit psychiatric patients who can benefit from active treatment, regardless of diagnosis or the availability of a staff psychiatrist. The guidelines (1979) also state that general hospitals should provide intermediate and long-term care to psychiatric patients if a need exists. A similar perspective was taken by Blair as early as 1969, in a review of mental health services in Alberta, when he recommended that the active treatment general hospital should be regarded as the primary facility for the treatment of the mentally ill. More recently, a task force to review Alberta's Mental Health Act (Drewry, 1983) recommended that all general hospitals in the province, 30 beds and over, be designated as facilities to hold and treat involuntary patients.

Despite the increase in treatment responsbility for the mentally ill, the role of the general hospital in Canada has never been clearly defined in terms of the psychiatric care functions it should be providing to the community or its relationship with the rest of the mental health delivery system (Health & Welfare Canada, 1979). The absence of a well-defined role for general hospital psychiatry has been associated with two key problems in previous mental health planning efforts (Heseltine, 1982):

1. There has been a tendency to respond to unmet needs by adding facilities and services without examination of service-specific geographic patterns of utilization to determine if existing services are being used efficiently and effectively. Further, the relation between resource supply and utlization of mental health services has infrequently been examined.

2. Comprehensive needs assessments, which should include studies of the level of care, identification of

patterns of care (i.e. how mental health services are used), and identification of diagnosis-specific utilization patterns have been lacking.

Thus, the need for information pertaining to the operation of the mental health delivery system is not only a prerequisite for rational planning, but it is also an identified need with respect to establishing the roles of psychiatric services for general hospitals.

1.2 Objectives of the Study

In response to the problems identified with previous mental health planning efforts, and the current need for information regarding how and by whom mental health services are being used, the following objectives were formulated for this longitudinal study of psychiatric inpatient utilization of general hospitals in Alberta (hereafter referred to as hospital utilization):

1. To describe provincial trends in hospital utilization patterns for psychiatric disorders for persons 15 years of age and older; and to further describe utilization patterns by bed type (hospitals with psychiatric beds versus hospitals with medical beds only), diagnosis, and gender.

2. To describe regional trends in hospital utilization rates over time based on Alberta's recently established mental health care planning regions.

3. To describe psychiatric patient origin-hospital destination utilization patterns from both a community-

based (CB) and provider-based perspective (PB) by bed type and region.

In order to achieve the above objectives, hospital utilization data and age-sex adjusted population data were used to derive the information base for this study. For analytic purposes, the focus of this study was on the adult population (15 years of age and above) since this demographic group comprises the principal users of psychiatric resources in general hospitals.

1.3 Significance of the Study

The need for a clearly formulated provincial plan for the delivery of mental health services in Alberta is a major current concern of both government policy makers and health care providers. Of immediate importance are the potential changes to existing mental health legislation which will likely have a substantial influence on patterns of hospital utilization by the mentally ill. Recently completed studies of psychiatric service needs in northern Alberta (McKinsey & Company, 1980) and southern Alberta (Clarke Consulting Group, 1983) have provided general information on the status of mental health services in the province. Based on recommendations from these studies (1980; 1983), plans to regionalize mental health care services in Alberta are being considered. However, geographic patterns of utilization were not studied in depth, nor were service-specific patterns of utilization examined in relation to the type of care provided.

In view of the above comments, the current investigation is of significance in two respects. Firstly, population-based measures of utilization will identify trends in rates of use over time and will provide a base for estimating future demand of acute care hospitals by the mentally ill for various planning scenarios. Secondly, the use of a patient origin-destination method to examine geographic patterns of hospital utilization will provide an empirical measure of regional resource use by the mentally ill.

As indicated, an information base of this type has not previously been compiled in Alberta. Findings from this study may, therefore, also be useful in the formulation of recommendations for the allocation of acute care psychiatric beds in regional mental health service areas, and in the development of guidelines for the role of psychiatric services in acute care hospitals.

1.4 Assumptions and Limitations

To achieve the study objectives, it was necessary to make the following methodological assumptions.

1. At the aggregate level, the observed demand for hospital care was assumed to be a meaningful approximation of need. Although less than ideal, this assumption recognizes the methodological difficulties in estimating the number of mentally ill in the population requiring acute hospitalization.

2. Alberta's acute care hospital system functions as a "closed system". As the study population is composed exclusively of provincial residents who utilize Alberta hospitals, it was assumed that patterns of utilization would be minimally influenced by non-residents or by provincial residents utilizing facilities outside Alberta.

3. The province can be divided into mutually exclusive and exhaustive geographic areas, as per the existing General Hospital Districts (GHDs). It was further assumed that the aggregation of these GHDs could be accomplished for the identification of regional utilization patterns.

4. Service-specific patterns of general hospital utilization by the mentally ill can be approximated by the use of bed type (psychiatric beds versus general medical-surgical beds). A related assumption was that the complexity or level of psychiatric care provided would be associated with service-specific hospital utilization patterns.

Insufficiencies in the available data and the restrictions imposed by the methodology resulted in the following limitations to the study.

1. Population data were used to derive age-sex adjusted rates of hospital utilization. As census data were available only for the years 1971, 1976, and 1981, it was necessary to use population estimates for intercensal years to obtain population-based measures of hospital

utilization.

2. Psychiatric morbidity data based on the Professional Activity Study (PAS) comprised a major portion of the data base for this study. The most recent data available from government sources at the time this investigation was initiated were two years old. Consequently, changing patterns of utilization in response to changes in resource supply and location during that twc year period could not be identified.

3. The unit of analysis employed in this study was based on a count of hospital separations as recorded by PAS. Thus, readmissions by individual patients could not be identified, nor could the actual number of individual patients utilizing acute care hospital psychiatric services be determined.

4. The diagnostic coding system used in Alberta underwent two revisions during the study period. These changes resulted in several differences among codes used to describe mental disorders. However, as equivalent diagnostic codes were obtained from the Commission on Professional and Hospital Activities, (the governing body which develops and publishes the diagnostic coding schemes employed by all PAS subscriber hospitals), this was not considered to be a major limitation.

5. Geocodes to identify place of patient origin are recorded by PAS according to their GHD of residence. The inability to describe the precise geographic location of

psychiatric patients was perceived to be a minor limitation as GHDs were assumed to be appropriate for small area analyses of hospital utilization.

6. The analyses used in this study relied on descriptive statistics to summarize important aspects of the population and their use of acute care hospitals in Alberta for psychiatric care. Therefore, generalizations beyond the information contained in the data base were not made with respect to projected use of the acute care hospital system by the mentally ill.

1.5 Definition of Terms

The following definitions are provided to clarify the technical terminology employed in this study. To reduce any ambiguity associated with defining mental health services, definitions used by Statistics Canada (1980, p.9) were cited.

1. GENERAL HOSPITAL/ACUTE CARE HOSPITAL: A hospital which provides short-term treatment to all types of acute care patients, including the mentally ill.
2. PSYCHIATRIC UNIT: A separate unit within an acute care hospital which provides short-term, intensive treatment and care to patients with psychiatric disorders.
3. NON-PSYCHIATRIC WARD: A section of an acute care hospital which treats patients with a known or suspected psychiatric disorder in medical or surgical beds.
4. MENTAL HOSPITAL: an institution which provides long-term treatment to patients with psychiatric disorders and

may include an active treatment unit.

5. SEPARATION: A hospital separation refers to the official discharge or death of an inpatient.

6. PATIENT DAYS: The total number of inpatient days counted for patients admitted and separated from an acute care hospital during a specified time period, usually one year.

7. LENGTH OF STAY: The total number of days stay for inpatients who were separated from a hospital during the reporting year.

8. AVERAGE LENGTH OF STAY: The average number of patient days per inpatient separated from a hospital during a given year. The average length of stay is determined by dividing the total days stay by the number of separations during that year.

9. PATIENT ORIGIN: The General Hospital District which represents the permanent residence of a patient prior to hospital admission.

10. PATIENT DESTINATION: The acute care hospital to which the patient is admitted for psychiatric care.

1.6 Format of the Thesis

This investigation of hospital utilization patterns by the mentally ill in Alberta is organized into five chapters, the first of which comprised the introduction. The second chapter provides a conceptual base for the study through a selected review of the literature. The study methodology is presented in chapter three while the results and discussion sections are presented in chapter four. Finally, a review of the principal findings, resulting conclusions, and recommendations for further study are discussed in chapter five.

CHAPTER II

A SELECTIVE REVIEW OF THE LITERATURE

A selective review of the literature is presented in this chapter to assist in the development of a conceptual framework for the study objectives and methodology. The review is subdivided into four sections which focus on: 1) a conceptual model of hospital utilization by the mentally ill; 2) aspects of psychiatric utilization behaviour which are of particular relevance to this study; 3) a review of previous Alberta-based research concerned with psychiatric service needs; and 4) a review of patient origin-destination studies and their planning applications.

2.1 Conceptual Model of Utilization

Factors which influence the utilization of health care services have been identified in many studies. For example, socio-demographic characteristics of the population as well as the supply and distribution of health care resources have been shown to be important correlates of health service use (Babigan, 1977; Harris, 1975; Lieberman, 1975; Meade, 1974; Wennberg & Gittelsohn, 1973). Although conceptual models of health services utilization have been developed and tested for various components of the health delivery system (Anderson & Newman, 1973; Bay & Nestman, 1980; Griffith, 1978), few have focused specifically on the use of mental health care services (Williams & Richardson, 1980).

One model which has frequently been used in the health care literature as a theoretical framework to study patterns and trends in utilization (Raasok, 1979; Romeril-Smith, 1984; Williams & Richardson, 1980; Wolinsky, Coe, Miller, Prendergast, Creel & Chavez, 1983) is the organizational-behavioral model of health service utilization developed by Anderson and Newman (1973). This model (1973) recognizes three interactive factors which influence utilization: 1) characteristics of the health delivery system, 2) changes in treatment technologies and societal norms, and 3) characteristics of individuals which might predispose and enable them to utilize health care services.

The conceptual model of hospital utilization by the mentally ill, specifically developed for this thesis, is based upon the framework originated by Anderson and Newman (1973). Further, some of the model's components which are relevant to aspects of psychiatric utilization behavior are drawn from a mental health planning model formulated by Rosen, Goldsmith and Redick (1975). This latter model assumes that specific demographic and socio-economic characteristics of the population put certain members at higher risk of being admitted into psychiatric care. The conceptual model developed for this thesis, therefore, assumes that hospital utilization may be influenced by the interaction of environmental and individual determinants.

The environmental determinants of hospital utilization are defined by three components of the model: 1) the epidemiology of mental illness, 2) advances in medical technology which have altered modes of psychiatric treatment and practice, and 3) changes in formal legislation, which have influenced patterns of hospital utilization by the mentally ill.

The individual determinants of hospital utilization are also defined by three components, all of which are assumed to predispose or enable an individual to utilize psychiatric services: 1) socio-demographic characteristics such as age, sex, marital status and socio-economic status, 2) characteristics of the family and social support network, and 3) aspects of the socio-organizational environment of the mental health service system which may impact on an individual's ability to access care services.

The literature review which follows provides a brief overview of the major research findings pertaining to each component described in the conceptual model. The review is divided into two major sections. Environmental determinants are discussed in section 2.1.1 and individual determinants are discussed in section 2.1.2.

2.1.1 Environmental Determinants of Utilization

The environmental determinants of hospital utilization by the mentally ill discussed in the following sections are: 1) changes in medical technology and formal legislation, and 2) the epidemiology of mental illness.

Medical Technology and Formal Legislation

Medical advances made in psychiatric treatment during the past 30 years have had an important influence on the care provided to the mentally ill. Successful treatments with psychopharmacologic agents led to the symptomatic recovery of schizophrenia, the affective disorders, and psychoneuroses (Bachrach, 1976; Lipinski, 1981), and as a result, to the discharge of numerous patients from mental hospitals (Bachrach, 1981; Greenhill, 1979). As a consequence of the interaction between changing treatment practices and the deinstitutionalization of patients from mental hospitals, the primary responsibility for inpatient psychiatric care shifted from mental hospitals to general hospital psychiatric units (Bachrach, 1981; Cotton, Bene-Kociemba, & Cole, 1979; Greenhill, 1979; Sherl & Macht, 1979).

Chrichton (1975) contends, however, that changes in the provision of care for the mentally ill in Canada evolved primarily through two pieces of Federal legislation regarding the funding of health services, rather than through medical advances in treatment. Firstly, the initiation of the Mental Health Grants in 1948 (incorporated under the National Health Grants) assisted in the construction of approximately 1000 psychiatric beds in general hospitals and small psychiatric institutions throughout Canada by 1959 (Allodi & Kedward, 1973; Soderstrom, 1978; Williams & Luterbach, 1976). According to Allodi and Kedward (1973) the establishment of psychiatric units in general hospitals funded through this grant program played a major role in changing patterns of psychiatric care and increasing hospital utilization in the acute care sector.

Secondly, with the introduction of the Hospital Insurance and Diagnostic Services Act in 1957, federal-provincial cost sharing arrangements were established for services provided in general hospitals (Gelber, 1966; Lindenfeld, 1959). Costs incurred by provincial mental hospitals were excluded from this plan and, as a consequence, were borne exclusively by the provincial governments (Williams & Luterbach, 1976). Chrichton (1975) asserts that shifting the location of treatment from mental institutions to general hospitals was, therefore, strongly supported among the provincial governments due to the financial savings which could be realized under this cost sharing scheme.

Current concerns with patients' rights and the process of compulsory examination and hospitalization of the mentally ill may also alter patterns of hospital utilization (Sadoff, 1981; Toews, Prabhu & El-Guebaly, 1980). In a recent Task Force report (Drewry, 1983), which reviewed Alberta's Mental Health Act, it was recommended that involuntary hospitalization should follow a three-level progression in accord with the principles of community-based care and the "least restrictive alternative" (p.62) to psychiatric care. The three levels would include:

> ...short-term observation and assessment facilities within the local community.... medium length hospitalization facilities within the regional mental health area.... extended stay facilities at provincial psychiatric hospitals (p4).

In order to implement the above recommendations, the Drewry Task Force (1983) suggested that all general hospitals in Alberta (30 beds and over) be designated as facilities under the provincial Mental Health Act to admit involuntary patients for examination and/or treatment. Specifically, the Task Force (1983) proposed that hospitals of 30 to 60 beds, located in smaller communities throughout the province, should provide initial observation and assessment and be able to detain involuntary patients up to 96 hours. At the next restrictive level, the Task Force suggested that hospitals within each of the province's mental health care regions be authorized to hold involuntary patients for assessment and treatment for periods up to 28 days. In sharp contrast to current policy and practice, the Task Force (1983) recommended that commitment to a provincial mental hospital, the most restrictive level, should be viewed as a last resort for patients whose illnesses are "most severe or chronic" (p.63) and for whom "all other facilities in the community have failed in their efforts to help" (p.64). The length of stay for involuntary patients at provincial mental hospitals would be unlimited (1983). Inclusion of this recommendation, in a revised Mental Health Act for Alberta, would result in substantially altered patterns of hospital utilization.

Various perspectives have been expressed in the literature regarding the degree to which medical technology or formal legislation has increased the use of acute hospitals by the mentally ill. It would appear, however, that both factors have been instrumental, and will continue to be important, in altering patterns of hospital utilization for persons requiring psychiatric care.

Epidemiology of Mental Illness

In Canada, it has been estimated that 10% to 30% of the population experience some type of mental illness at any given time (Statistics Canada, 1981), that one in every six Canadians will require some form of psychiatric treatment during their lifetime (Canadian Mental Health Association, 1982), and that one in every eight Canadians will likely be hospitalized for psychiatric care at least once during their lifetime (Statistics Canada, 1981). It has also been reported (Statistics Canada, 1981) that mental illness was the second leading cause of general hospital utilization among the Canadian population aged 20 to 44 in 1978. As it is generally accepted that demographic characteristics of the population are associated with patterns of hospital utilization (Anderson, 1976; Soderstrom, 1978), the identification of target populations at risk of experiencing mental disorders has important implications for health care planning and for the allocation of resources.

A fundamental assumption of most epidemiological studies is that the incidence of disease is not evenly distributed throughout the population, but that the incidence of a specific disease will vary among certain demographic groups (Kramer, 1975; Mausner & Bahn, 1974; Reid, 1960). One of the most frequent findings in the epidemiological literature indicates that the prevalence of mental illness in the population is higher for females than for males (Gove, 1972; Huisani, Neff & Stone, 1979; Lipscomb, 1977; Warheit, Holzer, Bell & Arey, 1976), particularly for the affective disorders (Akiskal & Webb, 1983; Bland, 1977; Neugebauer, Dohrenwend & Dohrenwend, 1980; Rosen, Goldsmith & Redick, 1979), and the neuroses (Dohrenwend & Dohrenwend, 1982; Rosen et al., 1979). It has also been found that the rates of affective disorders in women tend to be higher across all age groups than the rates for men (Weissman & Klerman, 1977).

Although no consistent sex differences in the occurrence of schizophrenia have been reported in the literature, it has been shown to be most frequent in young adults (Clausen, 1979) with the population aged 18 to 29 being at greatest risk (Rosen et al., 1979). Schizophrenia, however, occurs only rarely in the population (Dohrenwend et al., 1982) and it has been estimated that only .6% to 3% of the population experience this illness (Dohrenwend, 1980). In contrast to these findings, prevalence rates for personality disorders and alcohol and drug dependence have repeatedly been found to be higher among men than among women (D'Arcy, 1977; Dohrenwend et al., 1982; Huisani, Neff & Stone, 1979; Rosen et al. 1979).

Among the elderly population, the risk of developing organic psychotic conditions increases steadily with advancing age (Butler, 1975; Brody & Kleban, 1981). Depression has also been found to be a common disorder among the aged (Butler, 1975; Glasscote, Gudeman & Mills, 1977; Health & Welfare Canada, 1982; Butler, 1975), as are high rates of suicide, which are highest in elderly, white males, and often associated with depression (Butler, 1975; Health & Welfare Canada, 1982).

Although the prevalence rate of mental illness in the elderly has not been firmly established, it has been estimated that approximately 18% to 25% of this population group experience some type of mental disorder (Brody & Kleban, 1981; Dohrenwend, 1980). It is also estimated that approximately 3.5% to 5.5% of the elderly, 60 years of age and older, experience an organic psychotic illness

(Dohrenwend, 1980; Health & Welfare Canada, 1982), while affective disorders and schizophrenia combined are estimated to affect only 3.5% of the elderly population (Dohrenwend, 1980). In contrast, 6% to 10.5% of the elderly are estimated to experience some type of neurotic disorder at any given time (Dohrenwend, 1980).

The above findings, which have been based on rates of treated illness as well as on community surveys, indicate that mental illness occurs in a sizeable proportion of the population. Despite this observation, Dohrenwend (1980) notes that a consistent finding in the epidemiological literature indicates that, among adults, only a small proportion of those with identifiable mental disorders are treated by mental health professionals, either on an inpatient or outpatient basis. In sum, these studies not only demonstrate the importance of demographic and diagnostic factors with respect to the potential need and demand for general hospital psychiatric services, but also suggest the need to examine individual characteristics of the mentally ill which influence their behavioral responses in seeking psychiatric care.

2.1.2 Individual Determinants of Utilization

Individual determinants of utilization are those variables which predispose and enable persons to utilize health care services. These factors include certain socio-demographic characteristics, characteristic of the family and social support system, and the socio-organizational environment of the mental health delivery system.

Socio Demographic Characteristics of the Mentally Ill

According to Selig (1975), factors such as sex, age, marital status, socio-economic status, patient attitudes towards the sick role, and characteristics of social support networks influence the mentally ill person's perceptions of his health care needs as well as his behavioral responses in seeking care.

With respect to gender, several investigators have found that females are significantly higher utilizers of health services for psychiatric problems than are males (D'Arcy, 1977; Gove, 1972; Rosen, Goldsmith & Redick, 1979; Warheit, Holzer, Bell & Arey, 1976). This finding has led some authors to suggest that the strongest predictor of mental health service utilization is sex (D'Arcy , 1977; Gove, 1972). Although the literature indicates that age has some influence on the number of persons seeking psychiatric care, females tend to have higher utilization rates irrespective of age group (D'Arcy et al., 1979; Weissman & Klerman, 1977).

Several theories have been offered as an explanation for this observation. One perspective states that women are more likely to be mentally ill than men due to increased stress caused by rapid changes in women's roles over the past decade (Gove, 1972). Labelling theory offers another perspective. This theory states that women are not biologically more susceptible to developing a mental illness than men, but rather they are more likely than men to be labelled as being mentally ill because of their willingness to admit to illness and seek psychiatric care, and because of the stereotyped responses of health professionals towards women (D'Arcy & Schmitz, 1979; Gove, 1972; Rosen, Goldsmith, & Redick, 1979; Weissman & Klerman, 1977).

In terms of the influence which social roles have on the utilization of psychiatric services, many studies have shown a strong association between marital status and the likelihood of being admitted into hospital for care (Bland, 1982; Bland & Orn, 1981; D'Arcy, 1977; Gove, 1972; Mezey & Evans, 1970; Warheit, Holzer, Bell & Arey, 1976). According to D'Arcy and Schmitz (1979) the results of several studies have indicated that rates of hospitalization for mental disorders are lower among married individuals than among single persons and persons whose marriages have been disrupted.

In a 1973 study, Redick and Johnson (cited in Rosen et al., 1979, p. 24) found that hospitalization rates among the U.S. adult population (14 years of age and older) admitted to all types of psychiatric facilities were unusually high for the divorced, separated and widowed. Further, the admission rates were higher for both men and women who lived alone or with other nonrelated individuals (1979). Gove (1982) found, in his review of the literature, that hospitalization rates for married women with a diagnosed mental disorder were higher than the rates for married men. In contrast, higher hospitalization rates were found for men who were single, divorced or widowed (1972). Findings such as these have led Rosen et al. (1979) to suggest that marriage likely reduces the risk of hospitalization for the mentally ill as the marital partner provides stability and social support, and permits the spouse to be cared for at home rather than in a hospital. These findings have also prompted Bachrach (1975) to conclude that the strongest predictor of stress related physical and emotional illness among adult men and women is marital disruption.

One final socio-demographic variable which has been associated with high rates of mental illness is low socio-economic status, typically measured in terms of income, education, and occupation (Bland & Orn, 1981; Dohrenwend & Dohrenwend, 1982; Goldberg & Morrison, 1963; Mezey & Evans, 1970; Miller & Mishler, 1959; Rosen, Goldsmith & Redick, 1979).

Various theories have been advanced in an effort to explain the observed relationship between low socio-economic status and high rates of schizophrenia and other serious mental disorders. One theory suggests that individuals from lower socio-economic backgrounds have a higher risk of experiencing a mental illness because of biological and/or sociological deficiencies (Cockerham, 1982). Another possible explanation focuses on the notion of "social drift" (Bland & Orn, 1981; Mezey & Evans, 1970; Rosen, Goldsmith & Redick, 1979). This theory asserts that individuals with chronic and serious mental disorders cannot compete in the labor market and as a result, drift into the lowest socio-economic class. Alternatively, families in lower socio-economic brackets are hypothesized to be less willing to care for and maintain family members with serious mental disorders and tend to have them hospitalized (Rosen et al., 1979).

The theories and findings regarding socio-demographic characteristics of the mentally ill would appear to indicate that social roles and relationships also have some influence on determining an individual's pathways into psychiatric care.

Family and Social Support Networks

Several studies investigating the association between the social environment and its impact on the mentally ill have shown that social and family factors have an influence on patient entrance into care (Greenley & Mechanic, 1976; Horwitz, 1977). These factors were also reported to have an influence on the mentally ill in terms of their average length of hospital stays, their level of community adjustment, and the subsequent likelihood of readmission into care (Bland & Orn, 1978; Greenblatt, Becera & Serafatinides, 1982; Wilkinson & O'Connor, 1982).

Over the past decade, increasing attention has been given to identifying the characteristics of an individual's family and social support network which appear to protect and support mental health (Bachrach, 1981; Greenblatt, Becera & Serafatinides, 1982; Wilkinson & O'Connor, 1982). For example, Rosen et al. (1979) note, in their review of the literature, that mentally ill persons who do not live in a family household experience higher rates of hospitalization than those who reside in a family unit. This finding has been most apparent for the mentally ill who live alone, particularly for males. Lieberman (1975) has suggested that mentally ill persons without family support also tend to over-utilize hospitals in part because other community social support services are lacking.

The notion that social isolation increases the likelihood of hospital admission for certain mentally ill persons is supported by Greenblatt, Becera & Serafatinides (1982). These authors note that the quantity and quality of family and social support networks for the mentally ill differ from those of the general population's in their tendency to be restricted and poorly formed. Consequently, the nuclear family and social support network appears to play a major role in increasing feelings of self-esteem and self-worth, which in turn maintain and promote psychological well-being.

While it is important to understand the social factors that lead individuals into treatment, it is equally as important to understand how the organization of hospital services may impede an individual's access to care.

Socio-Organizational Environment

Despite the removal of major financial barriers, which may impede access to health care services, Donabedian (1973), among others (MacStravic, 1978; Mechanic, 1978), has observed that the socio-organizational environment in which the health delivery system operates may also limit accessibility to care. Donabedian (1973) defines this environment as,

> all characteristics of resources, other than spatial attributes, that either facilitate or hinder efforts of the client to reach care.... Of special importance in this context are formal or informal admission policies that exclude patients by color, economic ability, or diagnosis (p.420).

With respect to the mentally ill, the literature indicates that certain administrative policies have been developed which restrict admissions to general hospitals in North America for the chronically ill and the elderly (Butler, 1975; Greenhill, 1979; Prosen & Toews, 1982). The principal argument in support of restrictive admission policies focuses on the role of the general hospital psychiatric unit as an acute treatment service which should ideally serve as many short-stay patients as possible (Brook, 1964; Greenhill, 1979; Prosen & Toews, 1982).

In support of this argument, Prosen and Toews (1982) contend that the designated function of the psychiatric unit would be compromised if a large number of patients with chronic schizophrenia were admitted. Others argue that admitting the chronically ill would force the psychiatric unit to serve as a substitute for mental hospitals (Flamm, 1979; Friedman, 1981; Schulberg, 1963). However, Manucci and Kaufmann (1966) have found the general hospital to play a beneficial role in providing short-term treatment to certain chronically ill patients. Further, in the province of Saskatchewan, which has one of the lowest rates of mental hospitalization in the world (Smith, 1979; Williams & Luterbach, 1976), the majority of psychiatric patients, regardless of diagnosis, are successfully treated in general hospitals or in the private sector (D'Arcy & Fritz, 1979).

Elderly persons have also been the focus of restrictive admissions to general hospital psychiatric units (Butler, 1975; Sadavoy, 1981; Schwarz, Stovel & Bennett, 1980). Schwarz, Stovel and Bennett (1980) report that of the seven general hospital psychiatric units located in Vancouver, British Columbia, "two have set a mandatory age limit of 65 or 70 on admissions" (p.633). Sadavoy (1981), in his study of treatment outcomes for psychogeriatric patients at a Toronto hospital, contends that many general hospitals in Canada have failed to recognize the important role they could play in providing acute psychiatric care to the elderly. Restrictive admission policies aimed at the elderly are not unique to

Canada. In the U.S., Butler (1975) reports that large, teaching hospitals infrequently admit psychogeriatric patients despite the well-documented finding that a large number of the elderly are subject to emotional and mental disorders.

The rationale for refusing admissions to the elderly appears to be based on the assumption that discharge problems would be created for general hospitals due to the chronic nature of their mental disorders and the lack of support services available in the community (Butler, 1975; Sadavoy, 1981). Symptoms of depression and acute brain disorder in the elderly, however, are reported to be similar to symptoms of chronic brain disorder, particularly senility (Sadavoy, 1981). While the general hospital may not necessarily be the appropriate facility for treating all chronic brain disorders experienced by the elderly (Butler, 1975), Sadavoy (1981) and Schwarz, et al. (1980) argue, on the basis of their outcome measures, that depression and acute brain disorders suffered by the elderly can appropriately and successfully be treated in the general hospital.

The administrative policies regarding the current role of the psychiatric unit in Canada have led Richman and Harris (1982) to conclude that general hospitals selectively admit psychiatric patients who can benefit from short-term, intensive treatment. Consequently, a disproportionate number of patients admitted to psychiatric units tend to be represented by "females...with neurotic conditions and highly motivated, cooperative patients with supportive and stable families" (1982, p.12).

2.1.3 Summary

Environmental and individual determinants of utilization were discussed as part of the conceptual framework for studying patterns and trends in hospital utilization by the mentally ill. The major findings from the literature reviewed in the preceding sections are summarized below.

1. Changes in federal health care legislation in Canada, particularly with respect to funding policies, and medical advances made in the treatment of mental illness have had an important influence on the increased use of acute care hospitals to treat the mentally ill.

2. Estimates of the prevalence of mental disorders in the population consistently indicate that females tend to have higher rates of diagnoseable mental disorders than males.

3. Individual determinants of hospital utilization by the mentally ill appear to be most strongly associated with sex and diagnosis.

4. Restrictive admission policies to psychiatric units in certain Canadian hospitals appear to limit accessibility to acute hospital care for the chronically ill, particularly schizophrenics and psychogeriatric

patients.

These findings further suggest that trends and patterns of psychiatric hospitalization should be examined in terms of the interaction between patient and provider characteristics.

2.2 Selected Aspects of Utilization

Defining the role of a hospital is critical to the planning process as it provides the foundation for determining the appropriate range and level of service needs and programs (Griffith, Hancock & Munson, 1976). In order to plan programs and services, however, knowledge of the population to be served and their patterns of utilization is required. Three factors which have an important influence on hospital utilization are reviewed in the following subsections.

Firstly, the literature pertaining to the role of the general hospital for inpatient psychiatric services has tended to focus almost exclusively on the psychiatric unit (Keill, 1981; Moll, 1965; Greenhill, 1979; Prosen & Toews, 1982). Non-psychiatric wards (NPW) in general hospitals, also play an important role in providing care to certain patients, particularly in non-urban areas of Canada. Studies pertaining to the diagnosis-specific use of NPWs will, therefore, be reviewed in order to obtain a more comprehensive picture of the general hospital's recent role in treating the mentally ill.

Secondly, the chronic or recurring nature of many mental disorders, and the lack of appropriate community support services, has led to repeated inpatient admissions for certain patients (Bachrach, 1981; Statistics Canada, 1982). A review of the literature on psychiatric readmission patterns in general hospitals will, therefore, not only provide an understanding of hospital utilization by this "revolving door" patient population, but will also assist in interpreting research findings from the present study.

Finally, the roles that other components of the mental health service system have played in terms of influencing patterns of hospital utilization will be considered. Specifically, the literature pertaining to the use of outpatient services and mental hospitals will be briefly reviewed in terms of their impact on general utilization.

2.2.1 Use of Non-Psychiatric Wards

The evaluation of service roles for small or rural hospitals, 100 beds or less, has become the focus of recent attention in Canada (Alberta Hospital Association, 1982; Black, 1979; Downs, 1980, McQueen 1977). The need to review the role of rural hospitals has been attributed to the specialization of medicine and the resulting concentration of specialist physicians in urban areas where population size can support a viable caseload (Alberta Hospital Association, 1982; Fruen, 1982; Northcott, 1980). Consequently, small general hospitals located in rural areas have found it increasingly difficult to attract specialists, (such as psychiatrists), for full-time practice (Downs, 1982).

With respect to the role of psychiatric services in small general hospitals, Canadian guidelines for adult psychiatric services (Health & Welfare Canada, 1979) state that a need will always exist for acute inpatient psychiatric care. Therefore, all general hospitals should admit psychiatric patients even if they do not have a staff psychiatrist. The guidelines (1979) also recommend that psychiatric units should be established only if there is a psychiatrist on staff. The implication is that NPWs in general hospitals should be used for treating the mentally ill at a less complex level of care.

According to Statistics Canada (1980), NPWs in general hospitals treat patients with a "known or suspected psychiatric diagnosis [but not] in a demarcated psychiatric unit" (p.9). Patients admitted to NPWs are, therefore, provided care in beds set up for general use on medical or surgical wards (1980).

In a recent survey of rural hospitals in Alberta, Heaton (1981) found that a substantial portion of the total workload was devoted to caring for patients with mental disorders. According to Heaton, the majority of hospitals surveyed stated that the provision of psychiatric services was considered "essential" and "important" (p.18, Table IV). Further, the need for psychiatric care was given a high priority by the majority of hospitals responding to the survey, with the exception of those under 20 beds or serving fewer than 1000 persons.

Despite the growing recognition that NPWs are providing treatment to a considerable number of the mentally ill in Canada (Heaton, 1981; McKinsey & Company, 1979; Cardillo, 1980), few studies have specifically examined utilization patterns of these facilities by the mentally ill. Only one such study could be found by this investigator. Findings from this Canadian study (Cardillo, 1980) indicated that the majority, 56.8%, of the psychiatric separations from general hospitals in Canada during 1975 were from NPWs as opposed to psychiatric units. The findings also showed that patients with neuroses and alcohol disorders respectively accounted for 36.2% and 30.5% of the separations. In contrast, only 7.5% and 5.2% of the separations were respectively accounted for by patients with affective disorders and schizophrenia. In keeping with the general findings in the epidemiological literature, Cardillo (1980) reports that the proportion of separations for males and females were substantially different for the major diagnostic groups. For the neuroses and affective disorders, approximately 72% to 73% of the separations were accounted for by females, whereas 80.7% of the separations related to alcoholism were accounted for by males.

Cardillo (1980) also found that 56.3% of the patients separated from NPWs during 1975 had an average length of stay of less than 7 days, while only 4.3% had stays exceeding one month. On the basis of these findings, it would appear that hospitals without psychiatric units in Canada are providing short-term psychiatric care to patients with relatively less severe disorders.

2.2.2 Psychiatric Readmission Patterns in General Hospitals

The community oriented approach for the provision of psychiatric care in Canada during the 1960's (Williams & Luterbach, 1976) was prompted by the growing recognition that long stays in mental hospitals tended to reinforce the chronicity of psychiatric illness and decrease the likelihood for successful reintegration of patients into the community (Allodi & Kedward, 1977; Bachrach, 1979; Arboleda-Florez, Pablo & Kadlec, 1982). However, the appropriate community support services to assist the deinstitutionalized mental hospital patients were not adequately planned (Bachrach, 1981; Cotton, Bene-Kociemba & Cole, 1979; Scherl & Macht, 1979); and, as a consequence, numerous patients experienced repeated admissions to hospitals (Arboleda-Florez, et al., 1982).

According to Pablo, Kadlec and Lamarre (1982), the majority of utilization studies which have examined psychiatric readmission patterns have tended to focus on only one facility, typically a mental hospital. Although there is a lack of information in the literature regarding readmission patterns to general hospitals, readmission statistics for psychiatric units in Canada were published by the Federal government (up to 1981) in special annual reports (Riley, 1982).

In 1978, for example, Statistics Canada (1981) reported that of the 63,134 admissions to psychiatric units in public general hospitals, 29,087 (46.1%) were readmissions. A breakdown of readmission patterns by diagnosis revealed that patients with psychotic and neurotic disorders respectively accounted for 13,111 (45.1%) and 10,109 (34.8%) of the readmissions.

One study which examined psychiatric readmission patterns on NPWs and psychiatric units has recently been conducted in Alberta (Arboleda-Florez, Pablo & Kadlec, 1982). This study identified a cohort of 2,325 psychotic patients who were separated from a general hospital in Alberta during 1973, and who experienced no readmissions to a mental hospital during the six year study period (1973 to 1978).

Findings of particular relevance to this study indicated that of the 2,325 psychotic patients admitted to general hospitals in Alberta during 1973, only 812 (35%) were admitted more than once during the six year study period. Of these 812 patients, more than half, or 421 (52%), had only one readmission; 169 patients (21%) experienced two readmissions. The remaining 222 (27%) patients in this group had three or more readmissions during the study period. With respect to readmission patterns on psychiatric units and NPWs, 479 (34%) of the 1,415 patients treated only on psychiatric units experienced one or more readmissions, and 188 (24.6%) of the 765 patients treated only on NPWs had one or more readmissions. Thus, 75.4% of the psychotic patients admitted to non-psychiatric wards and 66% of the psychotic patients admitted to psychiatric units had only one admission during the entire study period. Readmission data for patients admitted to both types of facilities were not provided.

These findings not only provide a better perspective on how general hospitals in the province are being used by certain patient groups, but they may also provide some indication of the relative validity of per capita utilization rates calculated in this study for persons with psychotic disorders. On a broader level, however, it should be noted that patterns of utilization on psychiatric units and NPWS may vary as a result of the number and types of hospital beds and alternative mental health services available in different geographic areas. This aspect of inpatient utilization is considered in the following section of the literature review.

2.2.3 Use of Alternative Services

Community-based approaches to psychiatric care stress the importance of providing integrated and comprehensive services to the mentally ill (Bachrach, 1975; Gittleman &

Blumberg, 1975; Moran, 1980). As noted by Williams and Richardson (1980), "mental health care includes a diverse range of services" (p.305). These services can be provided in hospital settings for inpatients, in ambulatory care clinics for outpatients, and in day or night programs for partially hospitalized patients. Care can also be provided in non-hospital based settings through public health departments, private practioners, and community clinics. Studies investigating the influence of alternative services on patterns of mental health service use are receiving increasing attention (Williams & Richardson, 1980) as the availability and adequacy of alternative services in a community appear to influence the demand for inpatient hospital care (Bachrach, 1975, Moran, 1980).

In one southern U.S. study, Ames (1978) found that the creation of a psychiatric unit in a rural general hospital significantly altered patterns of mental health service use. Findings from this study indicated that the availability of a "new resource [to area residents]... provided an effective alternative to the state mental hospital for persons in need of hospital care" (p.791). During the first three years of the psychiatric unit's existence, admissions to the state mental hospital decreased by 45% in the catchment area as care shifted to the general hospital. Further, in the county where coordination between the psychiatric unit and the community mental health centre was greatest, increased referrals to the general hospital served to decrease mental hospital admissions by almost 60 per cent (Ames, 1978).

In another U.S. study, Babigan (1977) found that the establishment of a community mental health centre (CMHC) in one New York county decreased inpatient utilization rates in the catchment area's mental and general hospitals. This decrease in hospital utilization occurred despite the addition of 50 acute care psychiatric beds in the catchment area. The investigator (1977) attributed this decrease in inpatient utilization to the increased use of outpatient services made available in the new CMHC.

As noted by Bachrach (1975), changing modes of practice and treatment philosophy appear to emphasize the use of outpatient psychiatric services over inpatient care; however, when inpatient care is required, treatment in acute care hospitals is favoured over admissions to mental hospitals. To illustrate this change in treatment philosophy, Bachrach (1975) cites U.S. statistics which show that in 1955, at the start of the deinstitutionalization movement, outpatient services accounted for only 10% of patient care episodes. In contrast, during 1972, 42% of all psychiatric patient care episodes in the U.S. were treated in the outpatient services sector (Bachrach, 1975).

In Saskatchewan, LaFave and Vandenham (1979) report that discharge rates as well as readmission rates to provincial mental hospitals have decreased steadily since 1963. During the same time period, however, utilization of outpatient services as an alternative to hospitalization continued to increase. The use of alternative psychiatric programs has also increased in Alberta. Between 1976 and 1981-1982, the number of visits to general hospital outpatient clinics and day or night hospital programs rose by 71% (from 14,533 to 24,265 visits) and 82% (from 27,986 to 54,032 visits) respectively (AHMC, 1982). The establishment of regional mental health clinics (RHMCs) by the Department of Social Services and Community Health also had an important influence on altering patterns of general hospital utilization. In 1979, for example, RHMCs provided care to approximately 7,100 patients in comparison to the 2,900 treated in general hospitals (McKinsey & Company, 1980).

Based on these research findings, several investigators have concluded that the availability of alternative services influences the demand for inpatient psychiatric care. Moran (1980) states, however, that "there is no widely accepted or intuitively reasonable model of inpatient-outpatient dynamics available to guide planners" (p. 10) in assessing the potential need or demand for inpatient care.

In an attempt to quantify the impact of outpatient and other alternative services on the demand for inpatient psychiatric care, Moran (1980) studied utilization patterns in 171 general and psychiatric hospitals in the Veteran's Administration (VA) health system in the United States. Within the VA system, health insurance benefits to veterans cover all inpatient, outpatient, and other alternative services. Thus, cost is not considered to impede access to care. Two principle hypotheses were tested in this study: 1) that average length of stay (ALOS) would be shorter in hospitals with more comprehensive outpatient and alternative services, and 2) that this effect would be strongest for patients with longer-term, more severe psychiatric illnesses. Hospital size, staffing and occupancy rates were also examined as these variables are usually associated with length of stay (Moran, 1980).

Moran's (1980) findings supported the above two hypotheses. Specifically, ALOS was reduced by 50 days for psychotic patients in hospitals which provided four to five alternative programs in comparison with hospitals which provided only two alternatives to inpatient care. As predicted, these effects were smallest for patients with short stay, non-psychotic disorders. In addition to the increased availability of alternative programs provided in the larger VA hospitals, these findings were partially attributed to the diagnostic mix of the patients. In the VA system, as elsewhere, the more serious cases are usually referred to psychiatric or mental hospitals rather than to general hospitals. With respect to staffing, Moran found that changes in the number and mix of staff had less effect on ALOS than the number and variety of alternative services which were available, even when occupancy rates were not high.

On the basis of these findings, Moran (1980) argued that a principal determinant of inpatient hospitalization, (when health insurance benefits are equivalent across treatment settings), is the "array and capacity of alternative services" (p.24) which are available to the patient.

2.2.4 Summary

Selected aspects of hospital utilization were examined in this chapter, with reference to specific diagnostic groups and type of hospital care. The principal findings in the literature reviewed on the use of psychiatric units and NPWs, readmission patterns, and the impact of alternative services on inpatient utilization are summarized below.

1. It would appear that NPWs in Canadian general hospitals treat a substantial number of patients with diagnoses of neurosis or alcoholism. Of these patients, the large majority treated for neuroses and alcoholism tend to be females and males respectively. Further, the majority of all patients treated on NPWs tend to have an ALOS under one week.

2. Readmission patterns to general hospitals in

Alberta appear to be lower than the Canadian average. National statistics for 1978 indicated that 45% of the readmissions to psychiatric units were accounted for by patients with psychotic disorders. In comparison, during 1973 to 1978, among a cohort of psychotic patients hospitalized in Alberta, well over one half had only one admission to psychiatric units, while three fourths had only one admission to NPWs.

3. The number and type of outpatient and alternative mental health services available in a community appears to be an important factor in reducing the use of inpatient hospital services.

2.3 Psychiatric Service Needs in Alberta

Since 1969, three major studies of psychiatric service needs have been conducted in Alberta under the auspices of the provincial government (Blair, 1969; McKinsey & Company, 1980; Clarke Institute of Psychiatry: Consulting Group, 1982). All three of these studies were commissioned in response to the existing problems with Alberta's mental health care system: 1) the fragmentation of services, 2) resource shortages and, 3) the apparent inability of the system to meet the needs of the mentally ill in the province. Recommendations to regionalize mental health services, and to develop a comprehensive information system to plan, monitor and evaluate mental health services were made in each report. In the most recent reports, (Clarke Institute of Psychiatry: Consulting Groups, 1983; McKinsey & Company, 1980) recommendations were made to designate psychiatric units for the purpose of holding and treating involuntary patients. The major findings and recommendations from these reports which are relevant to this investigation are reviewed below.

2.3.1 The Blair Report

The Blair Report (1969) was one of the first comprehensive studies of mental health services to be conducted in Alberta. It was in this study that recommendations regarding the increased use of general hospitals for the care of the mentally ill in ~~Alberta~~ were first made. Specifically, Blair stated that:

> Active treatment general hospitals are strategically located throughout the Province. They are the community health centres for their localities. They require only improved facilities and the availability of psychiatric consultation for their effective operation in the mental health field (p.154).

In contrast to earlier recommendations made by the Canadian Psychiatric Association regarding the establishment of psychiatric units in all general hospitals of 200 or more beds (McKerracher & Smith, 1964), Blair recommended that units be established in all Alberta general hospitals of 100 or more beds (1969). He also stated that the number of dedicated psychiatric beds should comprise 10% of a hospital's total bed complement. Although Blair's notion of utilizing general hospitals as the primary facility for treating the mentally ill was well founded, his estimate of the number of dedicated psychiatric beds required in the general health care system was not determined by the results of population-based studies or patient origin-destination studies.

As noted in the Introduction to this study, previous mental health planning efforts have tended to focus on adding resources and services without careful assessment of whether current resources are being used efficiently and effectively (Heseltine, 1982). Blair (1969) appeared to recognize this also as indicated in the following statements:

> The present system has simply grown, not according to any systematic, long-range plan, not well based on reliable data concerning population trends and the incidence of illness, and not taking adequate account of the impact on the management of mental illness of drugs introduced years ago. The solution to mental health problems in Alberta has for a long time been to provide more mental hospital beds (p.39).

To assess the need for additional resources in general and mental hospitals, Blair examined general trends in utilization. However, the statistics published in the Blair Report to describe patterns of hospital utilization were limited to a brief overview of provincial data. For general hospitals, these data comprised only the number of separations and average length of stay for patients with 1) psychoses, 2) neuroses and, 3) all other mental disorders, categorized as behavior disorders, during the years 1961 through 1966. As reported by Blair, the number of psychiatric cases treated in Alberta's general hospitals steadily increased from 4,797 in 1961 to 7,588 in 1966; the ALOS remained relatively constant at 11.5 and 12.0 days despite the increase in cases. Blair (1969) concluded that although more psychiatric patients were being admitted to general hospitals, they were not long-stay patients. Of particular interest are the dramatic decreases in the number of separations for the psychoses and neuroses between 1965 and 1966. Although not discussed by Blair, the published data show that for the psychoses and neuroses, the number of cases steadily increased between 1961 and 1965, and then both suddenly decreased by 75% in 1966. In contrast, the number of cases for the behavior disorders continued to increase during the six year period, but showed an increase of 335% between 1965 and 1966.

Blair pointed out that the opening of the Foothills Hospital in Calgary during 1966 resulted in care being provided to an additional 170 psychiatric patients in the acute care sector. This figure provides some evidence for the association between resource availability and patterns of utilization. However, Blair makes no further reference to the dramatic changes in the diagnostic composition of the patient population, (likely due to changes in diagnostic codes), or to the seemingly disproportionate increase in the number of cases compared to the number of patients. Also, per capita rates of utilization were not derived for these longitudinal data. Thus, no comparative information was given for the increase in utilization relative to the increase in population during this time period. It would appear, therefore, that when examining trends in utilization it is necessary to report utilization rates following adjustments for changes in both diagnostic codes and the demographic composition of the population.

Subsequent to a detailed review and assessment of existing resources, Blair proposed that mental health services should be regionalized. Four levels of care were proposed for each region. The general hospital was described as being in the second of these four care levels. The first level would comprise non-hospital based community services, while the third and fourth levels respectively would comprise auxiliary and mental hospitals, and nursing homes and other special homes. Blair (1969) recommended that all patients who could not successfully be treated in the first care level should be referred to the "nearest active treatment general hospital psychiatric unit" (p.45). Admission policies, according to Blair, would initially be open to all diagnostic groups except those patients with diagnoses of alcohol psychoses or involuntary patients. It was suggested that these patients be referred to the provincial mental hospitals. Despite the recommendation that mental health services be regionalized, no suggestions were made as to where the regional boundaries should be located. In sum, the Blair Report advocated that Alberta's general hospitals were to be the principal locus of inpatient care for the mentally ill.

During the decade that followed the publication of the Blair Report, many of the recommendations pertaining to general and mental hospitals were implemented (McKinsey & Company, 1980). Specifically, numerous beds in the provincial mental hospitals were closed down which resulted in large reductions of their inpatient census. In addition, new psychiatric units were established in three Edmonton general hospitals (McKinsey & Company, 1980), and one unit was established in Medicine Hat (Clarke Institute of Psychiatry: Consulting Group, 1983). However, McKinsey et al. (1980), report that mental health professionals viewed the progress made during the 1970's to be insufficient in terms of establishing a well-integrated and coordinated system of care. As a result, the government of Alberta funded two additional studies of psychiatric service needs in 1979 (McKinsey & Company, 1980) and 1982 (Clarke Institute of Psychiatry: Consulting Group, 1983) to examine essentially the same problems which existed some ten years earlier.

2.3.2 The McKinsey Report

In 1979, at the request of the Edmonton Hospitals Psychiatric Study Committee, a study to investigate the need for psychiatric care in northern Alberta was undertaken by McKinsey & Company (1980). The major focus of the study was on the city of Edmonton, although northern Alberta was considered. The study methodology provided a descriptive overview of population growth trends and resource availability in relation to various demographic and special patient groups. In addition, utilization patterns for hospital and community services during 1979 were broadly reviewed.

The following were among the major recommendations made in the study: 1) the number of psychiatric beds in general hospitals be increased over the ensuing decade, and that all psychiatric units should be designated to admit and treat involuntary patients; 2) all hospital and community-based outpatient programs should be enhanced, and that treatment should be provided in ambulatory care facilities whenever possible; and 3) mental health services should be regionalized regional centres located in Edmonton, Grand Prairie, Fort McMurray and St. Paul.

The recommendations made in the McKinsey Report (1980) were based on a survey of existing resources which indicated that the "overwhelming majority" (p.8-3) of specialized services, including all psychiatric beds, were located in Edmonton during 1979. In addition, a cursory examination of patient referral patterns revealed that a small minority of the rural population in northern Alberta were using these resources, despite the fact that they comprised 47% of the population outside of Edmonton. Several problems resulting from the availability and distribution of psychiatric resources in northern Alberta were also identified in the McKinsey Report. Specifically, shortages of acute psychiatric beds and outpatient programs were reported to exist for the adult population, 16 years of age and over. Further, this population group was said to place the highest demand on the system.

According to the McKinsey Report, the lack of outpatient programs in northern Alberta resulted in the increased demand for admissions to psychiatric units. However, because of the bed shortages, the majority of psychiatric patients were admitted to medical or surgical beds. The investigators reported that,

> Occupancy rates for the [Edmonton] general hospitals were close to 90% on average in 1979 which is near maximum practical capacity (p.6-6)....because of the pressure for additional admissions, patients are discharged before they are fully ready to go (p.6-7).

Similarly, the McKinsey Report stated that because there are insufficient after-care facilities and alternative programs in the catchment area to which patients can be referred, discharges from inpatient beds can also be delayed. As discussed previously, the lack of alternative community mental health services would tend to increase hospital utilization and increase length of stay (Moran, 1981). In sum, the McKinsey Report stressed that a coordinated, long-range plan for mental health services must be developed in order to meet the psychiatric service needs of the population in Northern Alberta.

2.3.3 The Clarke Institute Report

In 1982, the Clarke Institute Consulting Group undertook a study, similar to the McKinsey Report (1980), to examine psychiatric service needs in southern Alberta. In total, 28 recommendations were made with respect to the planning, monitoring and funding of mental health services in southern Alberta.

One recommendation, which is of particular relevance to this study, pertained to the regionalization of mental health services. Specifically, the Consulting Group proposed that southern Alberta be divided into four regions namely, Calgary, Red Deer, Lethbridge and Medicine Hat. The boundaries for these regions were made coterminous with those established by Alberta Social Services and Community Health (SSCH).

With respect to the services which should be provided in each of the above mental health regions, the Consulting Group (1983) proposed that,

> every region provides _primary_ contact clinics, _secondary_ care in general hospital psychiatric units, and _tertiary_ care in a regional facility which serves to back up the general hospital units and to provide specialized programs (p. II-18).

In keeping with the philosophy of community-based care, the Consulting Group recommended that primary care be provided on an outpatient basis in local general hospitals or in community clinics. It was also recommended that care provided in psychiatric units should be no further than one hours drive from the patient's place of residence.

According to the investigators (1983), the system envisioned for southern Alberta's mental health service system represented the "state-of-the-art" in current psychiatric practice. However, the final report also pointed out that several problems in achieving this ideal system exist in southern Alberta. For example, community support and after-care services are severely lacking in urban areas and are nonexistent in rural areas of Southern Alberta. Again, this would tend to place more pressure on existing inpatient programs (McKinsey et al., 1980; Moran, 1982). Also, the number of psychiatrists per capita in southern Alberta is not only below the Canadian average, it is also "well below the levels of the better supplied provinces" (p. I-20 - I-21). The number of general hospital psychiatric beds per capita in southern Alberta during 1982 was also well below the Canadian average. Based on these findings, the Consulting Group stated that,

> The shortage of psychiatrists can lead to inefficient use of psychiatric beds, both when staff must wait for an infrequently available psychiatrist in order to admit or discharge a patient, and when entire units are closed because there is no psychiatrist to run them (p.I-24).

In contrast to the McKinsey Report, which recommended that additional psychiatric beds be added to the system, the Clarke Consulting Group advocated that consultation-liason and community outreach from the general hospitals should be strengthened. Also, before any additional beds are added to the system the Consulting Group stated that the appropriate community resources must be in place.

Similar to the McKinsey Report (1980), the Consulting Group advocated that all general hospital psychiatric units should be designated under the Mental Health Act to hold and treat involuntary patients. A strong recommendation was also made regarding the development of a comprehensive mental health information system to plan, monitor and evaluate services. The authors (1983) noted,

> As we carried out our study, we were constantly surprised at the difficulty of obtaining data and by the frequent contradiction of figures from [available] document to document concerning the same facility (p. III-26).

As a result of this difficulty, a longitudinal investigation of trends in utilization rates and geographic patterns of utilization could not be conducted by the Clarke Institute team, despite their recognition of its importance in planning.

2.3.4 Summary

Three major studies of psychiatric service needs in Alberta were reviewed. The major findings and recommendations resulting from these studies are summarized below:

1. Shortages of psychiatrists, acute psychiatric beds, and the lack of alternative outpatient programs have led to inefficient and ineffective use of psychiatric beds in

general hospitals, and have increased the demand for admission to psychiatric units.

2. Due to these resource shortages, both admissions to and discharges from general hospitals for psychiatric patients may be delayed. Conversely, high occupancy rates in psychiatric units and the increased demand for care can lead to early discharges, that is, before the patient is medically ready to be released from hospital care.

3. Mental health care services in Alberta should be regionalized; comprehensive networks of hospital and community-based care should be available to residents in each region.

4. All psychiatric units in general hospitals should be designated under the Mental Health Act to admit and treat involuntary patients.

5. A comprehensive information base should be established to plan, monitor and evaluate mental health services in Alberta.

Following the recommendations to regionalize mental health services in Alberta (Blair, 1969; McKinsey & Company, 1980; Clarke Institute of Psychiatry: Consulting Group, 1983), seven mental health regions were established in the province by the Departments of Hospitals and Medical Care and Social Services and Community Health (AHMC, 1984). Primary care is available in each region through regional mental health clinics (SSCH, 1984). Secondary care in psychiatric units is also currently available in each region (AHMC, 1983). At present, tertiary care is provided through the two provincial mental hospitals in Ponoka and Edmonton. According to Shonick (1976, p.20), a planning requirement for regionalizing health care services in this hierarchical fashion requires,

> the determination of hospital service areas, so that it can be established for particular hospitals what area populations they serve and conversely for particular areas, which hospitals serve their populations.

Patient origin-destination studies offer one approach to the empirical identification of hospital service areas and service populations. The methods used to examine patient flow patterns for this purpose are discussed in the following section.

2.4 Patient Origin Destination Studies

An essential step in the planning process is the determination of the size and geographic extent of the population served by a hospital (Griffith, 1976, p.39). The importance of identifying the hospital service population is summarized by MacStravic (1978, p.31):

> Knowledge of the population to be served by a given program will determine the extent of need for service, the likelihood of utilization, and the volume of demand expected.

The approach which is most frequently used to link patients with the hospital facilities they use is referred to as a patient origin study (Donabedian, 1972; Griffith, 1976; MacStravic, 1978; Miller, 1976; Shaughnessy, 1982;

Shonick, 1976). Such studies provide empirical data on patterns of hospital utilization by measuring patient residence (origin) to hospital (destination) flows for small areas.

Analyses of patient origin-destination flows have focused on the identification and measurement of: 1) the influence of geographic accessibility and certain patient and provider characteristics on patterns of hospital utilization, 2) hospital service areas and service populations, and 3) regional variations in utilization rates. This information, in turn, has been used to facilitate the planning and evaluation of hospital services. The literature reviewed in the following section highlights the major findings in each of the above areas that are relevant to the current investigation.

2.4.1 Geographic Accessibility and Patient Flow

The influence of spatial factors on patterns of hospital utilization by the mentally ill has been studied for well over 100 years (Donabedian, 1973; Schler & Thompson, 1970). According to Miller (1974), analyses of patient flow patterns with respect to distance from the source of care are assumed to be indirect, but objective, measures of accessibility. As a result, Miller states that for planning purposes,

> distance between the patient's place of residence and the hospital or other point of supply of medical care is the most frequently examined variable in health services research which deals with patterns of consumer behavior (p.9).

The underlying assumption in many of the early spatial studies was that physician referral practices, or patient choice, would lead to the use of the hospital facility closest to the patient's place of residence (Donabedian, 1976; Miller, 1976; Shonick, 1976; Studnicki, 1976). That is, patient flow patterns would reflect distance minimization behavior. If this assumption proved to be empirically correct, hospitals would be able to identify their service populations by using a distance criterion. The populations residing in geographic areas within a predetermined distance from the hospital could then, according to Studnicki (1976),

> provide the planning denominator for each facility, and the population within the area could be monitored as to size, demographic characteristics, incidence of diseases, and hospital utilization (p.679).

The literature indicates, however, that factors other than distance minimization behavior are operative in explaining geographic patterns of hospital utilization. In the mental health care literature, the earliest study on the effects of distance between a patient's place of origin and mental hospital admissions was conducted in Massachusetts by Jarvis in 1852 (cited in Sohler & Thompson, 1970 and Joseph & Boeckh, 1981). Jarvis' original finding, that an inverse relationship existed between mental hospital admission rates and the patient's distance from the hospital, has been replicated internationally (Sohler & Thompson, 1970) and is referred to as Jarvis' Law (cited in Donabedian, 1976). Within the past few decades, however, several researchers (Barr, 1957; Dear, 1977; Joseph, 1979; Joseph & Boeckh, 1981; Mellsop, 1969; Smith, 1976; Sohler & Thompson, 1970; Sohler, 1970; Stern, 1977;) have attempted to expand upon and refine Jarvis' Law by studying this distance decay effect in conjunction with selected patient and provider characteristics. Of the variables studied, the interactive effects of diagnosis and level of care required consistently appeared to modify the influence of distance on patterns of utilization by the mentally ill (Dear, 1977; Joseph & Boeckh, 1981; Mellsop, 1969; Person, 1966; Sohler & Thompson, 1970).

For example, in a study of psychiatric admission rates to a multi-level mental health facility in Australia, Mellsop (1969) found that total admission rates tended to decrease as distance from the facility increased. However, the distance decay effect was weakened in patients with the more severe psychiatric disorders. Specifically, in the geographic areas 100 miles from the facility, admission rates for persons with neuroses and personality disorders were 10% of those for persons residing in the area closest to the hospital. In contrast, admission rates for persons with psychoses were 25% of those for persons residing in the area closest to the hospital. As the age-sex distribution did not vary significantly among the areas studied, Mellsop hypothesized that differences in diagnosis-specific utilization rates were not due to differing morbidity rates in the population. Similar results were found in two U.S. studies which examined the effects of distance on (age-sex adjusted) diagnosis-specific admission rates to mental hospitals (Person, 1966; Sohler & Thompson, 1970).

In a Canadian study, Joseph and Boeckh (1981) analyzed the effects of distance on diagnosis-specific admission rates to all mental and general hospitals in the Peterborough, Ontario mental health catchment area. Diagnoses for outpatients were not available. Consequently, admissions for the outpatient group were analyzed at the aggregate level. Diagnoses for inpatients were divided into two groups: 1) the more serious diagnoses, schizophrenia, affective psychoses, and paranoid states; and, 2) the less serious diagnoses, neuroses, alcoholism, personality disorders and other non-psychotic mental disorders. As expected by the investigators, the analyses indicated that distance decay effects were most pronounced for both the outpatient group and the inpatient group with the less serious diagnoses. In contrast, the smallest effects were measured for inpatients with the more serious diagnoses. Interestingly, these effects appear to be maintained for patients requiring only outpatient care for mental disorders. For example, Dear (1977) found that diagnosis-specific utilization rates for persons utilizing outpatient psychiatric services in Lancaster, Pennsylvania tended to decrease for the less severe disorders as their distance from the outpatient facilities increased. With respect to this generally common finding in the literature, Joseph and Boeckh (1981) stated,

> ... for the least severe [mental] disorders, treatable usually on an outpatient basis, utilization rates are likely to be strongly [influenced] by distance-sensitive flows.... Even for moderately serious [conditions], not usually treatable on an out-patient basis, it is possible that [the family or physician] may be reluctant to place the individual concerned at a distant institution. However, for the most severe disorders, illness and the imperative for treatment is invariably recognized regardless of distance from potential sources of care (p. 396).

While the above studies employed physical distance as a measure of accessibility, several researchers (Bosanac, Parkinson & Hall, 1976; Drossness & Lubin, 1966; Marrinson, 1964; Morrill & Earickson, 1969), have asserted that travel time is a more accurate measure of access for studying the impact of distance on patient flow patterns. However, McGuirk and Porell (1984) criticize some of these earlier studies in that they tended to ignore the role of physician referral practices and/or the availability of alternative services in modifying the distance decay effect. McGuirk and Porell, therefore, developed a spatial demand model which attempted to account for both of these variables in measuring the effects of physical distance and travel time on patterns of hospital utilization.

Admission patterns (counted in terms of patient trips) to hospitals in Allegheny County, Pennsylvania were analyzed for four service categories: 1) obstetrics-gynecology (OB-GYN), 2) medicine-surgery (MED-SURG), 3) pediatrics (PED), and 4) psychiatry (PSY). McGuirk and Porell (1984) found that, of the four services, psychiatric patterns of utilization were least influenced by differences in access whether measured by distance or time; in contrast, MED-SURG and PED admissions were most influenced. When time alone was used as a measure of access, McGuirk and Porell found that "better statistical fits were obtained" (p.92) for all services with the exception of psychiatry. When distance alone was used as a measure of access, the influence of physician referral practices showed a significant positive association only for psychiatric admissions; large, negative correlations were found between the physician linkage variable and MED-SURG and PED admissions. The authors hypothesized that the,

> greater the choice of physicians close to a community, the lesser the likelihood of choosing one who is affiliated with a particular hospital (p. 91).

As the distribution of specialist physicians and resources tend to be concentrated in large metropolitan areas, patients requiring specialty care have generally been found to travel longer distances than those requiring general medical care (Ciocco & Altman, 1954; Morrill & Earickson, 1969; Sharp & McCarthy, 1971).

In summary, the above studies demonstrated that the severity of illness, the level of care required, and the functional organization of health services interact with geographic accessibility in influencing patient flow patterns. Consequently, the determination of hospital service areas and service populations cannot solely rely on a distance minimization assumption. The methods which have been developed to determine hospital service areas on the basis of actual patterns of patient flow are reviewed in the following section.

2.4.2 Delineation of Service Areas and Service Populations

Planners and researchers have tended to use three distinct approaches to delineate hospital service areas: 1) normative, 2) administrative, and 3) empirical (Donabedian, 1973; MacStravic, 1978; Shonick, 1976). The delineation of normative service areas is based on theoretically determined criteria and relevant data which result in optimizing health care delivery, such as reduced travel time or distance. The administrative approach defines hospital service areas on the basis of existing geographic or political subdivisions, such as census tracts or townships. Such an approach does not take into account existing patient flow patterns and has, therefore, not been found as useful for planning purposes as the empirical approach (Shonick, 1976). The empirical approach utilizes data based on actual patient origin-destination flows to identify the size and geographic extent of a hospital's service area and service population. It is this latter approach which is of particular relevance to the current research objectives.

One of the first studies to use an empirical approach to delineate service areas was conducted in the state of Pennsylvania by Ciocco and Altman (1954). Each service area was conceptually defined as being relatively self-sufficient in meeting the health care demands of its resident population. The principal ojective of the study was to develop a set of indices for delineating medical service areas based on patient origin-destination data for physician, hospital, and maternity care. Administratively defined boundaries (counties) were used to measure patient flow patterns and to construct medical service areas for each of the three data sets. Although Ciocco and Altman accepted the crossing of boundary lines in the process of obtaining medical care as a given, the problem in delineating self-sufficient service areas became one of deciding,

> when the movement of patients from one county to another [would be] of sufficient magnitude to characterize the first county as "dependent" on the second (p.11).

Based on the observed patient flow patterns, Ciocco and Altman defined dependent counties as those which had 6% or more of their residents seeking care in other counties. The dependent county would then form part of the service area of the county receiving the highest percentage of its' patient outflow. As expected by the investigators, the medical service areas obtained by applying each of the three indices showed a high degree of consistency. Ciocco and Altman's major contribution, however, was in revealing the importance of assessing the adequacy of available resources in a given area in terms of the actual population served.

The use of empirically defined, self-sufficient service areas as an objective measure for determining regional resource requirements was also recommended in a 1962 study by Poland and Lembcke (cited in Donabedian, 1973, pp.482-483, Griffith, 1972, pp. 68-79, and Shonick, 1976, pp. 65-68). Similar to the procedures used by Ciocco and Altman, Poland and Lembcke employed a 5% criterion for aggregating dependent townships. The final boundary lines drawn around service areas, however, were based on the assumption that patients were equally as likely to utilize hospitals in the service area as any of the other hospitals outside the service area. Poland and Lembcke's attempt to delineate mutually exclusive service areas in the predominantly rural state of Kansas was not successful. An examination of the patient flow patterns for specific diagnostic classifications revealed that many patients with conditions requiring more complex levels of care, bypassed geographically closer hospitals to obtain care at facilities with the appropriate resource mix. Consequently, Poland and Lembcke hypothesized that a hospital's drawing power over long distances would tend to be strongly associated with its concentration of specialty services.

While the preceding studies attempted to delineate mutually exclusive service areas for one or more hospitals, several researchers have focused on determining service area boundaries for individual facilities (Drossness, Reed, & Lubin, 1965; Morrill & Earickson, 1968; Meade, 1974). For example, Meade (1974) developed a mathematical "gravity model" to approximate patient flow patterns in the rural state of Idaho. Similar to Poland and Lembcke, Meade theorized that the greater the size and range of services available in a given hospital, the greater would be its drawing power over adjacent facilities. In other words, larger metropolitan area hospitals, with more technologically complex resources, would likely attract patients from longer distances than would smaller rural hospitals. Based on this assumption, service area boundaries could then be drawn on the points of maximum distance between two facilities where the larger of the two would exert its attractive force. A comparison of hospital service areas determined from actual patient flow data with the service areas obtained with the gravity flow model revealed a 96.5% match. Meade noted, however, that the success of the model in estimating actual patient flow patterns might be limited in metropolitan areas. In the predominantly rural state of Idaho, where distances between hospitals are great, the large majority of patients were found to utilize the facility closest to their place of residence. As a result, service areas for individual hospitals would have less of a tendency to overlap as they would in urban areas.

The delineation of mutually exclusive service areas for urban hospitals has continued to present methodological problems to researchers (Studnicki, 1976). Studnicki has summarized these problems by noting that:

> Patients, especially in metropolitan areas, are not distributed to hospitals in an optimal spatial pattern (p.680).... [Consequently, in] large cities and their surrounding urbanized areas, the effect of physical accessibility on the distribution of patients to hospitals becomes confused by the large number of alternative hospitals, the relatively small distances between choices, and the large numbers of patients serviced (p.681).

The need to estimate hospital service populations without relying on a predetermined geographic service area was recognized by Griffith (1972). Griffith noted, for example, a basic weakness in the Poland-Lembcke procedure was the use of an arbitrary 50% criterion to determine "in the service area or out" (p.75). By employing this procedure, the tendency for hospital use to diminish as the distance from it increased was ignored. Consequently, the proportionate contribution to a hospital's service population of patients residing in distant communities was not accounted for in Poland and Lembcke's equal-likelihood service areas.

As a solution to this problem, Griffith (1972) proposed the use of two indices which would estimate the size and geographic extent of a hospital's service population irrespective of patient origin. Griffith referred to these indices as a relevance index (R.I.) and a commitment index (C.I.). To facilitate the computation of these indices, Griffith employed a matrix format to identify each small area (rows) and hospital (columns) in the region being studied. The row-column intersections would then provide Griffith with an estimate of the number of patients (admissions) coming from a given community who utilized a particular hospital in the study area. By obtaining the percentage of total admissions generated by a given area (row total) to a particular hospital, Griffith was able to derive a set of R.I. values for each hospital. The R.I.s, in turn, provided an indication of the geographic extent of a hospital's service population by showing the tendency of each community to utilize that hospital. To estimate the size of the hospital's service population, the set of R.I. values were simply multiplied by the corresponding small area population and summed. Similarly, Griffith obtained a set of C.I. values to estimate the degree to which the resources of a given hospital were utilized by a particular community. The C.I. values were derived from the percentage of total admissions to a given hospital (column total) generated by each small area.

Bay and Nestman (1980) refined and expanded

Griffith's service population model. In this Alberta-based study, Bay and Nestman were able to demonstrate that hospital service populations could be estimated, under certain homogeneity assumptions, without directly defining a service area. A further refinement of Griffith's approach was Bay and Nestman's use of service population or resource commitment matrices, using patient days and hospital separations, to estimate RIs and CIs. Their model also permitted them to proportionally distribute each hospital's resources to each district served by that hospital. By examining various configurations of the service population and resource commitment matrices, Bay and Nestman developed a method for comparing per capita resource allocation and utilization rates on an inter-hospital and inter-district basis. In so doing, they were also able to demonstrate the utility of the service population model as a provincial or statewide planning tool, rather than focusing on individual hospitals as Griffith did.

On the basis of these research findings, it appears that for regional planning purposes, and for conducting comparative analyses of hospital utilization rates on a regional basis, the service population model developed by Griffith (1972) and Bay and Nestman (1980) would be applicable to the current investigation.

2.4.3. Small Area Analyses of Utilization

Small area analyses of patient flow patterns are recognized as being a useful method for assessing the relationship between characteristics of health care delivery systems and the populations they serve. As a prerequisite for rational planning, however, it has been demonstrated that a reliable estimate of the population served by a given set of resources must be derived (Griffith, 1972; Bay & Nestman, 1980). More importantly, any evaluation of patient/community and provider characteristics among small areas requires the use of age-sex adjusted per capita rates over a specified time period, if meaningful comparisons are to be made (Bay & Nestman, 1980 and 1984; Carstairs, 1981; Kessler, 1983; Shaughnessy, 1982).

In conducting small area analyses, Carstairs (1981), among others (Holzer, Jackson & Tweed, 1981), has pointed out that the definition and selection of small areas for population-based analyses is dependent upon the research objectives. For example, from a national planning perspective, a census division may be defined as a small area. In contrast, at a local community planning level, enumeration blocks or census tracts may be considered appropriate small areas for comparative purposes. Taube (1970) notes, however, that the aggregation of utilization data for large regional areas tends to mask significant variations in utilization patterns. Conversely, the smaller the areal unit of analysis, the greater will be the tendency for patient outflow from the area. In either case, comparisons of utilization rates will be biased not only by the size of the area chosen for analysis, but also by variations in the sizes of these areas, the availability of resources within each area, and the health care needs of the area's population. Comparative analyses of geographic variations in utilization rates must, therefore, rely on certain homogeneity assumptions (Bay & Nestman 1980, 1984).

Similar to the selection of a geographic unit for analysis, the approach taken in conducting small area analyses depends upon the research questions being asked (Carstairs, 1981; Shaughnessy, 1981). For comparing small area variations in health service utilization rates, a community-based (CB) or provider-based (PB) approach may be taken (Shaughnessy, 1981). Shaughnessy (1981) provides a useful summary of these two approaches which help to clarify the purpose and procedures of each.

The CB approach may be considered a population-based approach in that per capita measures of health service utilization are derived for a specific population. For this approach, a geographic area, such as a hospital district or group of districts, is used to define the "community" population. Total hospital utilization measures for this population are then obtained across all service providers, irrespective of hospital location. To calculate the per capita utilization rate, the total utilization figure is divided by the community population, after age-sex adjustment. CB measures may then be used to assess, for example, whether a specific community population experiences high or low per capita utilization rates. The PB approach derives per capita utilization measures which are intended to characterize providers, such as hospitals. For this approach, therefore, a specific provider or group of providers is identified. In contrast to the CB approach, the total utilization figure used in the numerator represents the experience of the provider group, not the community population. The denominator used for the rate calculation is the service population, the derivation of which is based on the R.I. method described by Griffith (1972). PB measures may then be used to compare provider groups on per capita utilization measures or supply measures, such as beds per capita.

Shaugnessy (1981) points out that PB measures are influenced by the tendencies of a community population to utilize a particular health service. In contrast, CB per capita measures represent the total utilization experience of a community population in a specific geographic area. CB measures would not, therefore, indicate the relative degree to which the community population utilized one provider service over another. Both the CB and PB approaches can, however, be extended to the comparison of trends in per capita measures over time through the use of retrospective utilization data and population data.

As an example, Babigan (1977) used the CB approach with longitudinal data to examine psychiatric utilization rates within and among mental health catchment areas (MHCAs) in Monroe County, New York in relation to changes in the availability of resources. Psychiatric utilization data and population data were obtained for each MHCA during the period 1960 to 1973. For each year and each MHCA, the total utilization figure was divided by the corresponding total area population to derive utilization rates. These per capita measures were then compared prior to and following the establishment of community mental health centres in three of the MHCAs. Thus, Babigan used each service area as its own control in examining trends in psychiatric utilization rates over time. A limitation of this study was the lack of adjustment for differences in the population composition within and among MHCAs over time.

In a more sophisticated application, Wilson and Tedeschi (1984) used a CB approach as a means for examining community correlates of medical and surgical hospital use in Michigan. "The total population living within each [service area] made up the reference populations whose hospital use, whether local or distant, was described and analyzed" (p.336). A three step model was developed to statistically explain the variation in small area utilization rates in terms of case mix, available resources, population age and other relevant demographic variables influencing hospital use. Patient days per 1000 persons (PDRT) was employed as the unit of analysis. The investigators selected PDRTs on the basis of its comprehensiveness as a measure of hospital use; that is, PDRTs could be broken down into discharge rates (DSRTS) and average length of stay (ALOS). The first step in the model involved an adjustment of the crude measures of DSRTS and ALOS to control for the effects of age and case mix differences among the community populations. At the second and third steps, two regression models were developed to determine how much of the observed variation in hospital utilization among the service areas could be explained by population characteristics and supply characteristics respectively.

The use of per capita measures for small area analyses from a PB perspective has been a primary focus of the work of Griffith. One of Griffith's major contributions to health care planning has been in detailing and demonstrating the methods for deriving per capita measures of utilization, cost, and quality for assessing the performance of a hospital or cluster of hospitals (1978). These methods were later tested in an evaluation of hospital performance in Michigan (Griffith, Restuccia, Tedeschi, Wilson & Auckerman, 1981). Griffith et al., noted that the methods were "imperfect" and required refinement, particularly in terms of adjustments for case mix and obtaining more comprehensive data on quality issues. With refinement, however, Griffith et al. stated that PB per capita measures would provide decision-makers with "data from which realistic health care goals can be set and achieved" (p.157).

Bay and Nestman (1984), however, used both the CB and PB approaches in their development of an empirical method for allocating acute care beds in Alberta hospitals. Based on the hospital service population model previously developed by Bay et al. (1980), age-sex adjusted per capita estimates of the beds used by residents in each district were derived. The set of bed distribution indices (BDIs) were then used to compare districts in terms of their potential for being over or under-bedded. While the BDIs were found to provide useful information for comparitive purposes, they did not indicate the degree to which the per capita bed distribution measures would be influenced by patients residing outside the district. The investigators, therefore, introduced the use of a service population index (SPI) to provide age-sex adjusted estimates of the number of persons served by each hospital bed, irrespective of their district of origin. The SPIs were then used to compare hospitals in terms of their service loads and their potential for being over or under-loaded. Consequently, Bay and Nestman were also able to demonstrate that the combined use of the CB and PB approaches would provide the most comprehensive and reliable information for regional planning purposes.

2.4.4 Summary

Patient origin-destination studies were reviewed in terms of their importance in identifying a hospital's service area and service population and deriving per capita measures of utilization for regional or system-wide planning purposes. The major research findings are summarized below.

1. Studies of patient flow patterns revealed that the severity of illness, the level of care required, and the distribution of health services interact with geographic accessibility in influencing patient origin-destination utilization patterns. These findings indicated that the delineation of service areas and service populations could not solely rely on assuming distance minimization as the primary determinant of patient flows from residence to care locations.

2. Based on these findings, several researchers developed empirical methods to estimate the size and geographic extent of a hospital's service population without direct reference to specific geographic areas. These hospital service population models, based on RI and CI measures, were demonstrated as being useful for aggregating geographic areas, such as hospital districts, as well as hospital service providers to examine per capita measures of utilization on a regional basis.

3. The procedures for comparing small area or regional measures of utilization based on the service population

model were reviewed from both a CB and PB perspective. Applications of the CB and PB approaches demonstrated their utility for assessing per capita measures of utilization with respect to available health care resources.

2.5 Summary

Based on the literature reviewed in the preceding chapter, the following conclusions were reached in terms of the relevance and application of the research findings to the current investigation.

1. The conceptual model of utilization developed for this thesis suggested that several environmental and individual determinants of hospital utilization have influenced psychiatric admission patterns to acute care hospitals over the past three decades. The utility of this information for planning purposes, however, is facilitated only by an understanding of how and by whom acute care hospitals are used for the treatment of mental disorders. This knowledge has been lacking in previous mental health planning efforts. As a result, facilities and services were added to the care system without knowledge of whether existing services were being used efficiently and effectively. Given the current mental health planning strategies in Alberta, which include the regionalization of services, the objectives formulated for this thesis would appear to be timely, as well as relevant, in facilitating rational planning and decision-making.

2. The literature review covered several aspects of hospital utilization by psychiatric patients in terms of the important interaction between patient demographics and diagnosis, and service-specific utilization patterns. The research findings also indicated the important influence that changes in treatment modalities and the distribution of acute care psychiatric beds have had on altering hospital utilization patterns. From a provincial perspective, a description of hospital utilization patterns, trends, and per capita utilization rates by bed type, diagnosis, and gender would, therefore, provide useful information for system-wide strategic planning efforts. A provincial perspective on utilization would also offer an opportunity to compare the psychiatric service role of Alberta's acute care hospitals with those in other jurisdictions.

3. As a further supplement to the information required for rational planning and decision-making, patient-origin destination studies have demonstrated their utility in explaining geographic patterns of utilization and delineating service areas and service populations. Although origin-destination studies have been undertaken to determine correlates of hospital utilization by the mentally ill, this method has typically not been used to delineate hospital service areas and service populations, as mental health catchment areas tend to be administratively defined. Further, a provincial analysis of psychia-

tric patient flow patterns has never been conducted in Alberta. Any efforts to regionalize mental health services in this province would, therefore, benefit from information on geographic patterns of hospital utilization over time from both a district (community-based) and hospital (provider-based) perspective. This information base could then be used to empirically identify variations in regional resource use by the mentally ill over time. An evaluation of the current allocation of psychiatric acute care beds can also be made through the use of bed distribution (BDI) and service population (SPI) indices.

In summary, the conclusions reached on the basis of the literature review indicated that several of the methods can and should be incorporated into the analytic procedures used in the current investigation.

CHAPTER III

METHODOLOGY

As discussed in Chapter I, previous mental health planning efforts have been characterized by a lack of information on service-specific and diagnosis-specific geographic patterns of utilization. Consequently, information to assist decision-makers in determining whether available resources have been used efficiently and effectively has also been lacking. In recognition of these problems, and to facilitate the regional planning strategies currently being developed for provincial mental health services in Alberta, the following objectives were formulated for this investigation.

1. To describe provincial trends in general hospital utilization for psychiatric disorders by persons 15 years of age and older; and to further describe utilization patterns by bed type (hospitals with psychiatric beds versus hospitals with medical beds only), diagnosis, and gender from 1971 to 1982/83.

2. To describe regional trends in psychiatric utilization rates over time based on Alberta's recently established mental health care planning regions.

3. To describe psychiatric patient origin-destination utilization patterns from a community-based and provider-based perspective by bed type and by region.

3.1 General Research Strategy

The overall research strategy developed for this thesis focused on providing a description of hospital utilization patterns and trends for psychiatric care in Alberta over time. A service population model (Bay & Nestman, 1980) was used to describe provincial and regional (REG) trends in hospital utilization rates from a CB perspective. This model was also used to carry out a patient origin-destination study to examine service-specific (PSY beds versus MED beds) and REG patterns of hospital utilization from both CB and PB perspectives.

To provide the most comprehensive description of hospital utilization patterns over time, all residents of Alberta, 15 years of age and older, who were hospitalized for psychiatric care during 1971 to 1982/83 were included in the study. Consequently, descriptive rather than inferential statistics were used to measure important aspects of the study population's psychiatric hospital utilization patterns.

Hospital utilization data and population data, obtained through the provincial government, formed the major part of the data base for the descriptive analyses. In addition to being descriptive in nature, this study may also be classified as an exploratory analysis of psychiatric hospital utilization patterns in that no specific hypotheses were formulated with regard to causal relationships among the variables. Rather, the results of the descriptive analyses were intended to provide the basis for developing more precise research questions or hypotheses for subsequent investigations.

As one of the major goals of descriptive or exploratory studies is to reliably document the characteristics of a particular group and the frequency of events being examined (Selltiz, Wrightsman & Cook, 1976), careful attention must be paid to selecting the appropriate data and adjustment methods to decrease the potential for biasing the results. The data sources and data modification procedures used to compile the statistical base for this thesis are, therefore, presented in some detail in section 3.2. The analytic procedures corresponding to each of the study objectives are presented in section 3.3.

3.2 Data Sources and Data Base Development

The principal sources of data and the procedures for adjusting these data are discussed in three subsections: 1) hospital utilization data, 2) population data, and 3) supplementary data.

3.2.1. Hospital Utilization Data

Hospital utilization data for the years 1971 through 1982/83 were provided on computer tapes by the provincial government through Alberta Hospitals and Medical Care (AHMC). These data form the "PAS (Professional Activity Study)/Morbidity File" used by AHMC to facilitate the planning and evaluation of hospital services. PAS data are derived from medical record abstract forms which acute care hospitals complete for each person separated from a facility. It is known, however, that certain individuals with mental disorders are readmitted to hospitals during the course of a year (Cardillo, 1980; Arboleda-Florez et al., 1982). Certain psychiatric patients may also be transferred to other hospitals providing care in psychiatric units. Consequently, the number of cases or separations may be somewhat larger then the number of individuals hospitalized.

The PAS data elements used to compile the statistical base for this thesis were: 1)patient age on admission, 2) sex, 3) primary diagnosis, 4) length of stay, 5) patient residence defined by general hospital district (GHD), and 6) hospital of patient admission.

The Commission on Professional and Hospital Activities (CPHA) in Ann Arbor, Michigan, responsible for the processing of the PAS separation abstracts, edits and compiles the hospital morbidity data for AHMC. Subsequent edits and file merging are performed by AHMC. The collection, editing and compilation of such massive data sets results in time delays on the order of two to three years prior to government release. The study period, therefore, spans the years 1971 through 1982/83. This time span represented the most recent PAS data available during the data base development phase of this thesis. It should be noted, however, that PAS data for the period January 1, 1979 to March 31, 1979 were unavailable. In order that the data remain longitudinally comparable, hospital utilization data for 1971 to 1978 span the 12 month calendar year. Hospital utilization data for the remainder of the study period span the 12 month fiscal year starting from April 1, 1979 to March 31, 1980, and for each subsequent year to March 31, 1983.

Selection of the Study Population

The study population included all Alberta residents, 15 years of age and older, who were separated from a provincial acute care hospital during 1971 to 1982/83 with a primary psychiatric diagnosis. Although information regarding secondary and tertiary diagnoses are reported on the PAS separation abstracts, only the primary diagnosis was selected, as it represents the principal cause for patient admission. The age criterion used in the analyses was based on 1) the known scarcity of child psychiatrists and inpatient psychiatic services for children in Alberta (Yates, 1982) and the relatively minor use of inpatient psychiatric services by the pediatric population (McKinsey & Co., 1980), 2) the age groups commonly used in the literature to distinguish between children, adolescents, and adults with mental disorders (Dohrenwend et al. 1980), and 3) to facilitate the calculation of utilization rates as census data are tabulated in five year age groups. Although the study population excluded persons 14 years of age and under, and included both adolescents (15 to 17 years of age) as well as adults (18 to 65 year of age and older), hereafter, the study population is referred to either as the adult population or the provincial population.

Diagnostic Codes

During the course of the study period, three diagnostic coding schemes were used by CPHA and subscribing hospitals. Consequently, the Hospital Adaptation of the International Classification of Diseases (H-ICDA) was employed from 1969 to 1973; the second edition, H-ICDA-2, was used from 1974 to 1978. In 1979, the ninth revision of the International Classification of Diseases, Clinical Modification (ICD-9-CM), a far more detailed coding scheme, was adopted for use by PAS hospitals. As a result of these changes, several of the diagnostic code numbers used to describe mental disorders were altered. To ensure the longitudinal comparability of diagnosis-specific utilization rates, a diagnosis conversion table prepared by CPHA was employed for these analyses. (See Appendix A for a listing of diagnostic categories and equivalent diagnosis codes.)

In each of these three coding schemes, the disease chapter on mental disorders was broadly categorized such that specific diagnostic codes could be grouped into the: 1)psychoses, 2) neuroses, 3) alcohol and drug related disorders, (ALC/DRUG), and 4) other non-psychotic mental disorders (OTHER). These four categories were used throughout this study to examine diagnosis-specific trends and patterns of hospital utilization. Utilization rates for mental retardation were not examined separately given the extremely low frequency of acute hospitalizations for this patient group. However, utilization data for mental retardation were included in the calculation of utilization rates for OTHER and total mental disorders. In sum, all diagnoses classified as mental disorders by CPHA were used to identify psychiatric separations on the PAS files and were included in these analyses.

Geographic Units of Analysis

An examination of regional utilization rates and patient flow patterns required that mutually exclusive geographic areas be employed for the analyses. In the province of Alberta, several investigators using population-based methods for describing small area as well as regional variations in hospital utilization rates (Bay & Nestman, 1980, 1984; Smith-Romeril, 1983; Toll, 1982) have found administratively defined general hospital districts (GHDs) to be useful for conducting these analyses. The GHDs were noted as being small enough to prevent masking of significant variations in utilization rates, yet large enough to permit feasible analyses of patient flow patterns. A related reason for employing GHDs was based on the observation that 93 of the 103 districts, in 1982/83, included only one hospital. It should be noted, however, that some minor changes were made to district boundaries during the course of the study period which resulted in the present configuration of GHDs. To facilitate longitudinal comparisons of utilization data, any districts which were combined during the study period were considered to be combined throughout the study period. The use of GHDs as the geographic unit of analysis also facilitated the measurement of origin-destination patterns and utilization rates as: 1)GHDs are coded on PAS separation abstracts according to the place of patient origin, 2) census data, collected by enumeration area, can be aggregated to approximate GHD boundaries, and 3) GHDs can be clustered to form larger geographic areas or regions.

While several advantages in using GHDs for small area analyses have been noted, the use of these geographic areas pose certain limitations as well. For example, northern Alberta contains several GHDs which cover large land areas but are sparsely populated. Further, the majority of acute care psychiatric (PSY) beds during most of the study period were located in Edmonton. In contrast, southern Alberta is characterized by smaller GHDs which are more densely populated. During the study period, PSY beds were distributed in Calgary, Lethbridge and Medicine Hat. These differences in the GHDs and the long distance patients in northern Alberta would be required to travel to receive care in psychiatric units, may have some influence on patient flow patterns.

The compilation of these data allowed hospital utilization trends to be described in terms of age, sex, diagnosis and bed type. These data further allowed patient origin-destination studies to be carried out from both a community-based (CB) and provider-based (PB) perspective. The examination of utilization figures over time and across geographic areas becomes meaningful, however, only when compared to a reference population. Thus, it has become standard practice in health care research to describe hospital utilization in terms of per capita rates. Population statistics were, therefore, required for the data base.

3.2.2 Population Statistics

Provincial population statistics for the years 1971, 1976 and 1981 were available from the federal census. These data, collected by enumeration areas, were tabulated by GHD for 19 age by sex groups and obtained from AHMC. Thus, the district population figures required for the computation of utilization rates for the adult population were available for the census years.

The derivation of utilization rates for intercensal years required that district populations be estimated. To simplify the calculations, it was assumed that an exponential pattern of growth and a constant or equal rate of population increase existed between the years 1971 and 1976, and the years 1976 and 1981. (See Appendix B for calculational formulae.)

Whether comparing utilization rates for different populations or the same population over time, variations in the age-sex structure of the population must be taken into account. By employing standardization procedures, the effects of these variations or changes in population composition are controlled, thereby permitting unbiased comparisons to be made (Matras, 1977). The indirect method of standardization was selected for the necessary age-sex adjustments to the district populations, as this method eliminated the extensive data manipulation procedures required for the direct method of age-sex adjustments and facilitated the interpretation of hospital utilization rates. As such, the indirect method uses the more stable rates of a larger population, such as the provincial population, to serve as the standard of comparison for smaller populations, such as district populations.

The weights derived for adjusting district population figures followed the basic approach described by Bay and Nestman (1980, 1984). Population and utilization figures, (patient days for all mental disorders), for the three census years were combined and tabulated by 13 age-sex groups for the adult population. By using combined data for the census years, changes in the age-sex composition of the population during the study period could also be adjusted. The age-sex specific utilization rates were then obtained and divided by the provincial utilization rate to derive the population weights. These weights provided a quantitative measure of the relative resource use/requirements for inpatient psychiatric care in each age-sex group. As indicated in Table 1, weights tended to increase with age. For example, weights for persons 75 years of age and older were four to five times greater than the weights for persons 15 to 19 years of age. Further, females in all age groups tended to have larger weights than males. By summing the weighted population figures, estimates of district service populations were obtained for the census years. (See Appendix C for computational formulae.)

As the census data were cross-sectional in that they provided a population count for a specific point in time (June 1 of the census year), and the PAS data provide a cumulative count of yearly hospital separations, the data bases were not entirely compatible. Theoretically, the validity of yearly hospital utilization rates based on census population figures could be questioned. However, it was thought that this limitation would not significantly distort any patterns or trends observed in the data.

3.2.3 Supplementary Data Sources

In order to estimate the number and distribution of acute care PSY beds across GHDs and mental health care regions (REGS) in Alberta, Annual Return data (Annual Return of Health Care Facilities-Hospitals, Part One) obtained from AHMC were employed. These data provided counts of the approved short-term psychiatric bed

Table 1

Age-Sex Adjusting Weights

Age Group	Males	Females
15-19	.44	.69
20-24	.53	.79
25-29	.52	.92
30-34	.58	1.02
35-39	.64	1.19
40-44	.72	1.36
45-49	.88	1.41
50-54	.96	1.53
55-59	1.09	1.75
60-64	1.18	1.66
65-69	1.29	1.75
70-74	1.51	1.91
75+	2.39	3.51

complement in each hospital during the study period. Annual reports issued by the Alberta Hospital Commission and AHMC during 1971 to 1982/83 provided additional information on the number of beds and district location of Alberta acute care hospitals. During this period of time, the reporting period for institutional data changed from calendar year to fiscal year in accord with the Hospital Commission's reorganization. The 1977/78 annual report, therefore, covered a 15-month period, from January 1, 1977 to March 31, 1978.

Information obtained from AHMC, in the form of unpublished reports, provided documentation on the current regional mental health care boundaries.

3.3 Analytic Steps

The data analyses were divided into three parts which corresponded to the overall study objectives; to describe: 1) provincial trends in hospital utilization by psychiatric patients; 2) regional trends and variations in psychiatric utilization patterns; and 3) patient origin-destination utilization patterns. The procedures used for each set of analyses are described in the following sections.

3.3.1 Provincial Analyses

The purpose of the provincial analyses was to examine overall trends in psychiatric hospital utilization patterns, and to further describe service-specific utilization trends by bed type (PSY beds versus MED beds) and diagnosis, and by sex and diagnosis over time. Utilization patterns by age group were also examined.

To carry out these analyses, annual hospital utilization data, (patient days "DAYS", separations "SEPS", and average length of stay "ALOS"), were aggregated separately for all hospitals in the province with dedicated PSY beds, and all hospitals which contained only MED beds during the course of the study period. Summing the utilization figures across hospitals for each year yielded the total provincial hospital utilization figures. The actual utilization figures were then examined for each year (1971, 1972, ... 1982/83) and for all years combined (1971-1982/83), or for each of the census years (1971, 1976, 1981/82). Psychiatric utilization rates (SEPRATES and DAYRATES) were derived by using either SEPS or DAYS in the numerator, and the provincial service population figures in the denominator.

3.3.2 Regional Analyses

The purpose of the regional analyses was to compare the relative consumption of psychiatric hospital resources by residents residing within each of the province's seven mental health care REGs over time. The analyses were conducted from a community-based (CB) perspective; that is, the data reflected the utilization patterns of residents in each REG, irrespective of where they had been hospitalized in the province for psychiatric care.

The regional analyses required that hospital districts be clustered to form larger geographic areas. The regional configuration was based on the mental health care planning regions developed by the Departments of Hospitals and Medical Care and Social Services and Community Health (AHMC, 1984). To facilitate the calculation of hospital utilization rates, minor adjustments were made to regional boundaries in order that they be coterminous with GHD boundaries. However, all hospitals which were in the unadjusted REGs, remained within those REGs; that is, the boundary adjustment procedure did not result in hospitals being reassigned to different REGs. Consequently, the boundary adjustments were not expected to distort the results of either the regional analyses or the patient-origin destination analyses to any great degree. Figures 1 and 2 respectively illustrate the unadjusted and adjusted regional boundaries. (See Appendix D for a listing of hospital and district names and their corresponding REG.)

The first set of analyses examined the distributions of SEPS and DAYS, for all psychiatric disorders, among the REGs and compared these data to the regional SEPRATE and DAYRATE distributions for the census years. The second set of analyses compared regional SEPRATES and DAYRATES for the entire 12 year study period (1971-1982/83) and indexed these rates to the provincial total. Finally regional comparisons were made for ALOS during each of the census years.

FIGURE 1

Unadjusted Mental Health Care
Regional Boundaries

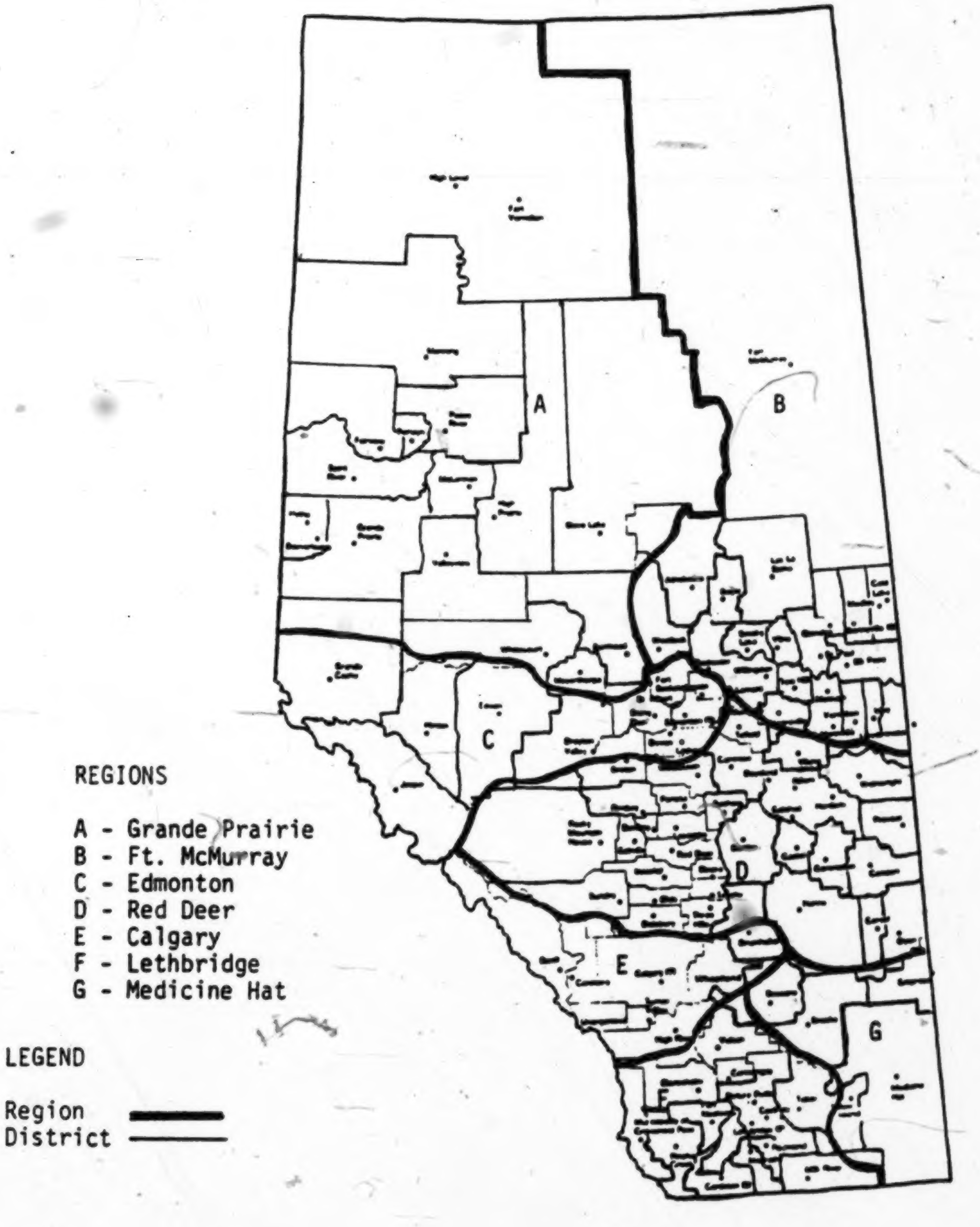
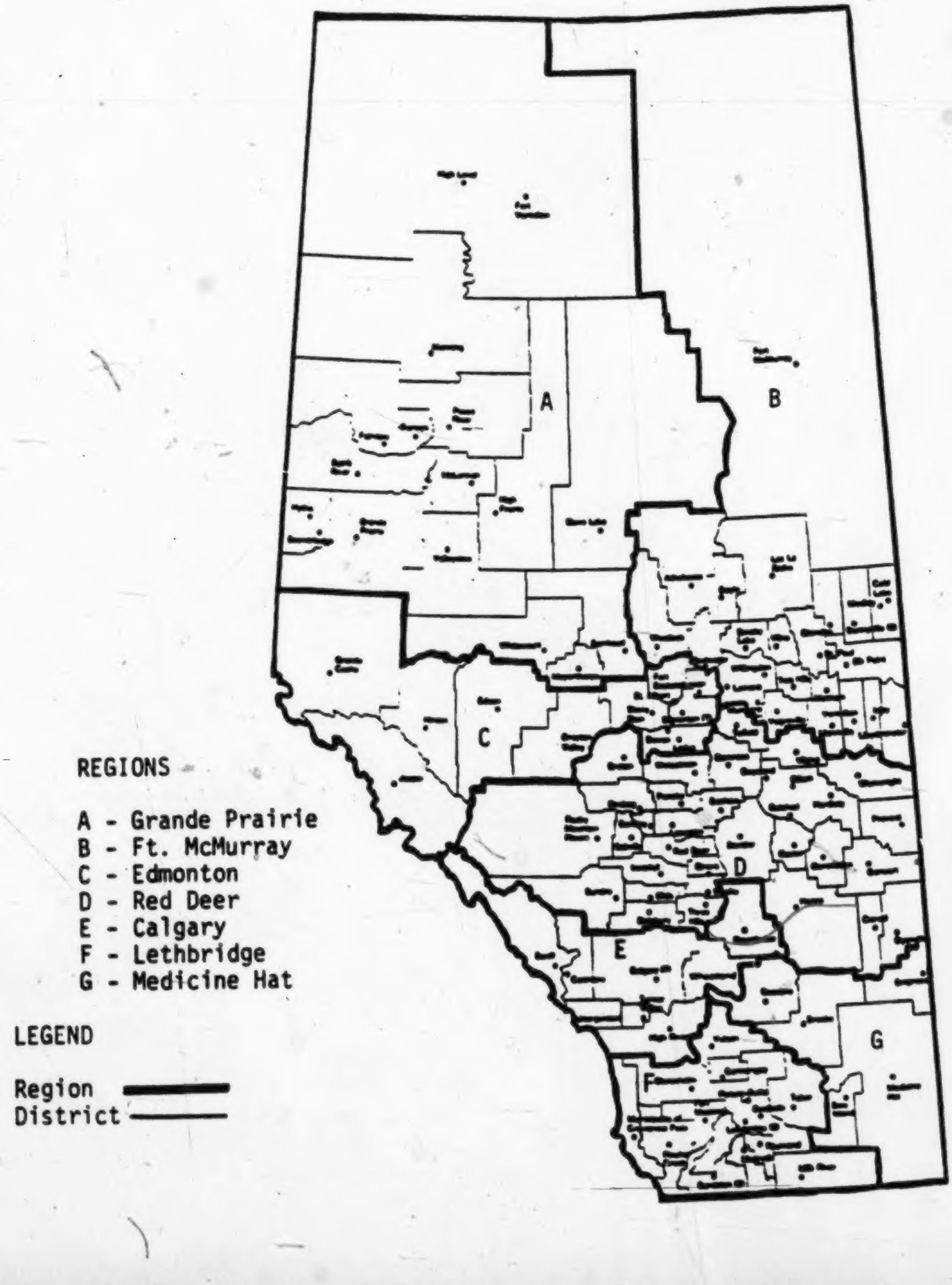

A
B
C
D
E
G
REGIONS
A - Grande Prairie
B - Ft. McMurray
C - Edmonton
D - Red Deer
E - Calgary
F - Lethbridge
G - Medicine Hat
LEGEND
Region
District

FIGURE 2

Adjusted Mental Health Care Regional Boundaries


A
B
C
D
E
F
G
REGIONS
A - Grande Prairie
B - Ft. McMurray
C - Edmonton
D - Red Deer
E - Calgary
F - Lethbridge
G - Medicine Hat
LEGEND
Region
District

3.3.3 Patient Origin-Destination Analyses

Patient origin-destination analyses were conducted from both a community-based (CB) and provider-based perspective (PB) (Bay & Nestman, 1984; Shaughnessy, 1981). Origin-destination analyses conducted from the CB perspective were intended to provide information on the tendency for residents of districts with PSY beds, or residents of districts with only MED beds, to remain within or travel outside their GHD or REG to receive psychiatric hospital care. Origin-destination analyses conducted from the PB perspective were intended to provide information on the tendency for hospitals to serve residents located within or outside of their GHD or REG. Relevance indices (RIs) and commitment indices (CIs) were derived for the CB and PB analyses respectively, for both SEPS and DAYS. (See Appendix E for computational formulae.) All patient origin-destination matrices were constructed according to the procedures developed by Griffith (1972) and Bay and Nestman (1980, 1984). Specific procedures corresponding to the CB and PB analyses are described below.

Community-Based Perspective: Relevance Indices

Three analyses were carried out from the CB perspective: 1) service-specific patterns of hospital utilization by bed type (PSY beds versus MED beds); 2) regional origin-destination utilization patterns based on Alberta's current mental health care planning regions; and 3) origin-destination utilization patterns to Edmonton and

Calgary district hospitals by district residents of each mental health care REG.

For the first analysis, service-specific patterns of hospital utilization were examined by aggregating all districts which contained PSY beds and all districts which contained only MED beds during the study period to serve as the place of patient origin. To represent the patient's hospital destination, all hospitals which contained PSY beds and all hospitals which contained only MED beds during the course of the study period were separately aggregated. The resulting 2 X 2 origin-destination matrices showed the proportion of SEPS and DAYS (RIs) residents of GHDs with PSY bed or MED beds experienced within their own district hospitals or in hospitals outside their district. Patient origin-destination utilization patterns were then described for all years combined, and for the years 1971 and 1982/83, for all psychiatric disorders and by diagnostic groups (psychoses, neuroses, ALC/DRUG, and OTHER). Finally, the ALOS experiences of residents of GHDs with MED bed or PSY beds within their own district and outside their district were compared for all psychiatric disorders and by diagnosis group.

For the second analysis, the origin-destination utilization patterns of residents residing within each of the province's seven mental health care REGs were also examined to estimate the relative degree to which psychiatric patients remained within their own REG or traveled to another REG to receive psychiatric hospital care. Regional patient flow patterns were measured for DAYS and SEPS by constructing a series of matrices where the rows represented the mental health care REG of patient origin. Similarly, the columns represented the hospital REG of patient destination. Relevance indices were calculated for all psychiatric disorders combined and for all years combined. The ALOS experiences of regional residents in their own and other REGs was also described.

As the results of the regional analyses showed that psychiatric patients required to leave their own REG for hospital care tended to travel to the Edmonton and Calgary REG hospitals, RIs were also derived for district residents in each REG to their own, and to Edmonton and Calgary district hospitals. For the third analysis from the CB perspective, the origin-destination matrices were constructed so that each district in each mental health care REG represented the place of patient origin, and Edmonton and Calgary hospitals with PSY beds represented the place of patient destination. Regional origin-destination maps were then developed to show the proportion of patient days, or RIs, (for all years and all diagnoses), that district residents in each REG spent within Edmonton or Calgary hospitals for psychiatric care.

Provider-Based Perspective: Commitment Indices

Three analyses were carried out from the PB perspective to estimate the relative tendency for hospitals with

PSY beds and hospitals with only MED beds to commit psychiatric resources to residents within their own or other districts or REGs. Procedures similar to those used in the CB analyses were employed.

For the first analysis, a series of 2 by 2 origin-destination matrices were constructed to examine CIs for DAYS and SEPS by bed type. The rows of the matrices represented the aggregation of all hospitals with PSY beds and all hospitals with only MED beds; that is, the hospital representing patient separation. The columns of the matrices represented the aggregation on all GHDs which contained PSY beds and all GHDs with only MED beds; that is, the resident district of the psychiatric patient. Commitment indices for DAYS and SEPS were then examined for all years combined and for the years 1971 and 1982/83, for all psychiatric disorders. Similar to the regional analyses carried out from the CB perspective, a series of 7 by 7 origin-destination matrices were constructed to estimate the proportionate amount of psychiatric resources (DAYS) hospitals in each REG commited to their own or non-regional residents. In this case, the rows of the matrices represented the hospitals/REGS of patient destination while the columns represented the REG of patient origin.

The third analysis undertaken from the PB perspective focused on the relative tendency for each of Edmonton's (four) and Calgary's (three) hospitals with PSY beds to commit psychiatric resources, in terms of DAYS, to residents of each mental health care REG. This analysis was undertaken as 51.1% of all psychiatric patient DAYS experienced by Alberta residents over the 12 years were spent in the seven Edmonton and Calgary hospitals with PSY beds. The rows of the origin-destination matrices constructed for this analysis therefore represented either: 1) Edmonton hospitals with PSY beds: University of Alberta Hospital, Royal Alexandra Hospital, Misericordia Hospital, and the Edmonton General Hospital, or 2) Calgary hospitals with PSY beds: Foothills Provincial General Hospital, Holy Cross Hospital, and the Calgary General Hospital. The columns of each origin-destination matrix represented the mental health care REG of patient origin. Commitment indices were then examined for all years and all diagnoses combined.

3.4 Summary

The methods used to examine hospital utilization patterns and trends by the mentally ill in Alberta were described in the preceding chapter. The overall research strategy involved the use of descriptive rather than inferential statistics to examine retrospective, longitudinal hospital utilization data. The data analyses were divided into three parts which corresponded to the study objectives: 1) provincial trends in psychiatric hospital utilization patterns and per capita utilization rates; 2) regional trends and variations in psychiatric utilization patterns and rates; and 3) psychiatric patient origin-destination utilization patterns. The methodological procedures used for each set of analyses were described.

CHAPTER IV

RESULTS

The results of the descriptive analyses are presented in three major sections: 1) provincial trends in hospital utilization by the mentally ill; 2) regional trends and variations in psychiatric utilization rates; and, 3) patient origin-destination utilization patterns within and among the mental health care regions (REGs). A profile of the Alberta acute care hospital system and adult population trends is also presented to assist in the interpretation of results.

4.1 Provincial Population and Hospital Profile

The purpose of the profile is to examine factors specific to the Alberta environment which could influence trends and patterns of hospital utilization by residents of Alberta, 15 years of age and older, who required psychiatric care. Information obtained from provincial government census data, annual reports, and annual returns from hospitals were reviewed in order to identify: 1) adult population trends in Alberta during the study period; 2) the configuration of general hospital districts (GHDs); and, 3) the supply and distribution of acute care hospitals and psychiatric (PSY) beds.

Adult Population Trends

The population of Alberta, 15 years of age and older, increased by 52.1% from 1971 (1.11 million) to 1981 (1.69 million) (Table 2). Although the overall growth in the adult population was relatively smooth, certain age groups experienced a much more dramatic rise in their numbers. Persons aged 25-34 years, for example, almost doubled in number between 1971 (219.6 thousands) and 1981 (435.3 thousands) representing a 98.2% increase; those aged 15-24 years increased by 57.5% in number during the same time period. As a result, 46.9% of the adult population in 1971, and slightly more than half the adult population during 1976 (50.2%) and 1981 (53.9%) were accounted for by the 15-34 years olds combined. The significant rise in the younger segments of the population during the 1970s may in part be attributed to the in-migration of persons seeking employment during Alberta's economic "boom" period.

With respect to gender, males respectively accounted for 50.5%, 50.4% and 50.9% of the adult population during each of the census years (Table 2). Whereas males outnumbered females across all age groups in 1971, this pattern changed somewhat over time. In 1976, females aged 45 years and above outnumbered males of the same ages, as did females 55 years of age and above during 1981. Most noticeable was the percentage increase in elderly females (65+ years, as per Table 2). In 1971, the proportion of elderly males and females in the adult population was almost equivalent. From 1971 to 1981, however, the

Table 2

Alberta Adult Population[1] Growth Trends: 1971-1981

	Census Years						Percent Change		
	1971		1976		1981				
Age Groups	#	(%)	#	(5)	#	(%)	1971-76	1976-81	1971-81
15-24	303.6	(27.2)	379.2	(28.3)	478.6	(28.2)	24.9	26.2	57.5
25-34	219.6	(19.7)	293.8	(21.9)	435.3	(25.7)	33.8	48.2	98.2
35-44	193.3	(17.3)	205.9	(15.4)	259.3	(15.3)	6.5	25.9	34.1
45-54	162.3	(14.6)	188.8	(14.1)	203.6	(12.0)	16.3	7.8	25.4
55-64	116.7	(10.5)	134.4	(10.0)	155.2	(9.2)	15.2	15.5	32.9
65+	119.0	(10.7)	137.8	(10.3)	163.3	(9.6)	15.8	18.5	37.2
Total	1114.5	(100.0)	1339.9	(100.0)	1695.3	(100.0)	20.2	26.5	52.1
Males									
15-24	151.9	(13.6)	193.5	(14.4)	246.6	(14.5)	27.3	27.4	62.3
25-34	111.1	(9.9)	149.9	(11.2)	227.6	(13.4)	51.8	104.8	86.9
35-44	101.1	(9.1)	106.0	(7.9)	134.1	(7.9)	4.8	26.5	32.6
45-54	81.2	(7.3)	93.2	(6.9)	106.0	(6.3)	14.7	13.7	30.5
55-64	59.0	(5.2)	66.4	(5.0)	76.1	(4.5)	12.5	14.6	28.9
65+	59.9	(5.4)	65.7	(4.4)	74.1	(4.4)	9.6	12.7	23.7
Total	564.2	(50.6)	674.7	(50.4)	864.5	(50.9)	19.5	28.1	53.2
Females									
15-24	151.7	(13.6)	185.7	(13.4)	232.0	(13.7)	22.4	24.9	52.7
25-34	108.5	(9.7)	143.9	(10.7)	207.7	(12.3)	32.6	44.3	86.9
35-44	92.2	(8.3)	99.9	(7.5)	125.2	(7.5)	8.3	25.3	23.8
45-54	81.1	(7.3)	95.6	(7.1)	97.6	(5.8)	17.8	2.0	20.3
55-64	57.7	(5.2)	68.0	(5.1)	79.1	(4.7)	17.8	16.3	37.0
65+	59.1	(5.4)	72.1	(5.4)	89.2	(5.3)	21.9	23.7	48.9
Total	550.3	(49.4)	665.2	(49.6)	830.8	(49.1)	20.8	24.8	50.9

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[1] The adult population is defined as persons 15 years of age and older.

increase in elderly females (48.9%) was twice that of elderly males (23.7%). Although it is generally accepted that females tend to have a somewhat longer life expectancy than males, this does not fully explain the almost equal number of elderly males and females residing in Alberta during 1971 and the increasingly large disparity in their numbers over time.

Acute Care Hospital System

General hospital districts (GHDs), of varying sizes, divide the province of Alberta into 103 mutually exclusive and exhaustive administrative areas (See Figure 1). Each district, (with the exception of two rural GHDs), contained at least one acute care hospital during the study period; 10 districts contained more than one hospital. These latter GHDs included: 1) metro-Edmonton and metro-Calgary, 2) Lethbridge regional GHD, and 3) seven rural GHDs (Beaverlodge-Hythe, Bonnyville, Cold Lake, Flaggstaff-Hughenden, Fort Vermilion-High Level, Lamont-Mundare-Willingdon and in 1982/83, Whitecourt-Fox Creek). The total number of hospitals in the province remained at 125 during the study period until 1982/83. During this year, the Fox Creek hospital opened in the Whitecourt GHD, bringing the provincial total to 126 hospitals.

From 1971 to 1979/80, only 9 of the province's 125 acute care hospitals, located in four GHDs (Edmonton, Calgary, Medicine Hat and Lethbridge), had dedicated PSY beds (Table 3). In 1980/81, hospitals in the Red Deer and Fort McMurray GHDs received approval to establish 10 bed psychiatric units; in 1982/83 the Camrose district hospital (Red Deer REG) also received approval to open a 10 bed psychiatric unit. From a regional perspective, the metropolitan regions contained between 84% and 89% of all dedicated PSY beds in the province, all of which were located in the Edmonton and Calgary GHDs. The southern regions contained between 9% and 11% of all dedicated PSY beds, while the Grande Prairie region in the north contained no PSY beds, and the Ft. McMurray and Red Deer regions gained PSY beds only in 1980/81. It should be noted, however, that the Grande Prairie district hospital opened a 24 bed psychiatric unit in 1985, and that between 1986 and 1988, an additional 208 acute care psychiatric beds will be opened in Alberta: 1) 121 in the Calgary district/REG, 2) 28 in the Edmonton district and 16 in the Sturgeon district for a total of 44 in the Edmonton REG, 3) 24 in the Lethbridge district/REG, 4) 8 in the Medicine Hat district/REG, and 5) 10 in the St. Paul district/Ft. McMurray REG.

From Table 3, it can be seen that the number of rated PSY beds in Alberta increased by 79 (22.9%) between 1971 and 1982/83. The number of MED beds, however, increased by 642 (5.5%). Despite this overall increase in the number of acute care hospital beds in the province, the number of rated PSY beds per 10,000 adults (15+ years) steadily

Table 3

Supply and Distribution of PSY Beds in Alberta: 1971-1982/83

REGION	1971	1972	1973	1974	1975	1976	1977	1978	1979/80	1980/81	1981/82	1982/83
Alta.	345	364	359	360	381	381	381	381	381	401	414	424
Metro												
Edn.	153	172	167	167	167	167	167	167	167	167	167	167
Calg.[1]	153	153	153	154	175	175	175	175	175	175	188	188
Central												
Red Deer	-	-	-	-	-	-	-	-	-	10	10	20
North												
Ft. McM.	-	-	-	-	-	-	-	-	-	10	10	10
Gr. Pr.	-	-	-	-	-	-	-	-	-	-	-	-
South												
Leth.	21	21	21	21	21	21	21	21	21	21	21	21
Med Hat.	18	18	18	18	18	18	18	18	18	18	18	18

[1] Does not include 21 beds in forensic unit funded after 1976.

Source: AHMC, Annual Return of Health Care Facilities: Hospitals (Part One) decreased from 3.0 in 1971 to 2.4 in 1982/83. The proportion of PSY beds to MED beds, however, remained relatively stable at 2% to 3 percent. This decrease in the per capita availability of PSY beds appeared to be the result of the disproportionate increase in the adult population (52.1%) relative to the increase in the actual number of PSY beds over time. Accordingly, the number of rated MED BEDS per 10,000 adults (15+ years) also decreased over time.

In addition to the variations in district size and the distribution of PSY beds among Alberta's GHDs, hospital districts varied with respect to population density and transportation routes. For example, during the course of the study period approximately 55% to 56% of the provincial service population resided in the Edmonton and Calgary hospital districts. In contrast, several of the districts in northern Alberta (e.g. Ft. McMurray, Grand Prairie, Ft. Vermilion), covered large land areas but in combination accounted for less than 6% of the provincial service population. It should be noted, however, that the population of the Ft. McMurray GHD more than doubled during the study period. Also, several of the northern-most GHDs (Ft. McMurray, Ft. Vermilion, Manning and Slave Lake), had few paved roads and only one major highway leading into or out of their respective districts. In comparison, the central and southern GHDs are not only considerably smaller in size but were also more densely populated and contained more extensive road networks.

Accordingly, the mental health care planning regions which are comprised of these GHDs share these same hospital resource, demographic, and geographic characteristics.

In summary, the preceding findings regarding Alberta's adult population trends, the supply and distribution of acute care psychiatric beds, and accessibility to those resources should be taken into consideration in reviewing and evaluating hospital utilization patterns for psychiatric disorders. Variations in these factors over time and across geographic areas could influence regional patient origin-destination patterns.

4.2 Provincial Trends in Psychiatric Hospital Utilization

Provincial trends in hospital utilization for psychiatric disorders were examined for: 1) all hospitals and districts combined; 2) by sex and diagnosis; and 3) by bed type (PSY beds versus MED beds) and diagnosis. Comparisons were made in terms of actual utilization figures (SEPS, DAYS and ALOS), and age-sex adjusted utilization rates (SEPRATES and DAYRATES) per 10,000 persons, 15 years of age and older. Utilization data were either examined for each year during the study period (1971, 1972, ... 1982/83), for all years combined (1971-1982/83), or for each of the census years (1971, 1976, and 1981). To facilitate discussion, the term "PSY beds" refers to hospitals which contained dedicated, short-term psychiatric beds at any time during the study period. The term "MED beds" refers to hospitals which contained only medical-surgical beds (i.e. no dedicated psychiatric beds) during the course of the study period.

4.2.1 Total Psychiatric Utilization Trends

During the study period, there were no distinct long-term trends in the total number of psychiatric SEPS from acute care hospitals (Table 4). There were, however, two observable short-term trends: 1) total SEPS increased by 2,836 (26.7%) from 1971 (10,637) to 1974 (13,473) and, 2) total SEPS decreased by 1,212 (8.9%) from 1974 to 1977 (12,261). Although some fluctuations were observed in the data, there was a general increase in SEPS from 1971 to 1976 (21.7%) and from 1976 to 1982/83 (5.4%). The initial increase in SEPS during the early 1970s may have been influenced somewhat by the publication of the Blair Report (1969, 1970) in Alberta, as well as the deinstitutionalization movement and the greater emphasis placed on the utilization of general hospitals for the treatment of the mentally ill (Bachrach, 1981; Greenhill, 1979).

Similar to psychiatric SEPS, no distinct long-term trends could be observed in the distribution of psychiatric DAYS. As shown in Table 4, DAYS tended to fluctuate from year to year. Again, however, the general trend was towards an increase in DAYS over time, although opposite to the trends observed for SEPS. From 1976 to 1982/83, for example, the number of days rose by 26.7%, more than twice the 11.9% increase in DAYS that occurred during 1971 to 1976. The deinstitutionalization movement

Table 4

Trends in Psychiatric SEPS, DAYS and ALOS: 1971-1982/83

Year	SEPS	DAYS	ALOS
1971	10,637	140,474	13.2
1972	11,890	164,151	13.8
1973	12,298	161,654	13.1
1974	13,473	161,990	12.0
1975	12,952	164,360	12.7
1976	12,947	157,195	12.1
1977	12,261	154,959	12.6
1978	13,208	165,288	12.5
1979/80	13,244	176,434	13.3
1980/81	12,467	170,674	13.7
1981/82	12,885	180,795	14.0
1982/83	13,648	199,027	14.6

Figures reported for patients 15 years of age and older.

Average length of stay in days per patient separation.

may have also influenced the increase in DAYS since patients with more severe disorders (e.g. psychoses) could have been treated in the acute care sector.

These utilization patterns are reflected in the ALOS distribution. The ALOS per patient separation remained relatively stable over time at 12 to 14 days per patient separation, however, there was an 8.3% decrease in ALOS from 1971 (13.2 days) to 1976 (12.1 days) and a 20.7% increase in ALOS from 1976 to 1982/83 (14.6 days). Although a general increase in the actual number of SEPS, DAYS and ALOS occurred during the 12 years, the increase in population during this time period occurred at a higher rate. This would suggest that on a per capita basis, fewer persons were being treated for psychiatric disorders in Alberta's acute care hospitals during the latter part of the study period (1976-1982/83) than from 1971 to 1976.

An examination of the SEPRATE and DAYRATE distributions would appear to confirm this. As demonstrated in Table 5, short-term trends in psychiatric SEPRATES parallelled the SEPS distribution. That is, SEPRATES increased from 1971 (93.4) to 1974 (107.3) and then gradually declined over time to 78.3 in 1982/83. Again, however, the overall trend indicates that from 1971 to 1976, SEPRATES decreased by only 3.2%, whereas SEPRATES from 1976 to 1982/83 decreased by 18.8 per cent. Psychiatric DAYRATES also tended to decline over time.

Table 5

Trends in Psychiatric SEPRATES and DAYRATES: 1971-1982/83

Year	SEPRATES	DAYRATES
1971	93.4	1233.4
1972	101.3	1397.7
1973	101.2	1330.9
1974	107.3	1291.5
1975	99.8	1266.6
1976	96.4	1170.8
1977	87.5	1105.9
1978	90.3	1129.9
1979/80	86.7	1154.9
1980/81	78.3	1069.4
1981/82	77.2	1084.0
1982/83	78.3	1141.5

Age-sex adjusted rates per 10,000 person-years, 15 years of age and older.

From 1971 to 1976, DAYRATES dropped by 5.1% and continued to decrease by 2.5% between 1976 and 1982/83.

In summary, the actual number of psychiatric SEPS and DAYS increased during the 12 year study period. However, hospital utilization rates, per 10,000 person-years, 15 years of age and older, declined over time. As SEPRATES dropped at a higher rate than DAYRATES, ALOS gradually increased during the latter half of the study period, despite the decline in the per capita availability of PSY beds and MED beds. This drop in SEPRATES and DAYRATES would initially appear to be the result of the disproportionate increase in population relative to the actual increase in psychiatric SEPS and DAYS. However, it is also possible that greater use of alternative mental health care services may have been influential in the declining hospital utilization rates.

With respect to gender, females consistently accounted for more than half of the total SEPS and DAYS, as well as the majority of SEPS and DAYS for all diagnostic categories with the exception of ALC/DRUG disorders (Table 6). The substantial difference in the hospital utilization experience for males and females was most pronounced for the neurotic disorders where more than 70% of the SEPS and DAYS were accounted for by females, and for ALC/DRUG disorders where approximately 73% of the SEPS and DAYS were accounted for by males. These results were consistent with findings in several other studies (Dohrenwend & Dohrenwend, 1982; Rosen et al., 1979), and

Table 6

Psychiatric SEPS, DAYS and ALOS by Sex and Diagnosis[1]

Diagnostic Category	Utilization Indicator	1971			1976			1981			1971-1982/83		
		Males	Females	%F	Males	Females	%F	Males	Females	%F	Males	Females	%F
Psychoses	SEPS	1,227	1,698	58.1	1,681	2,226	57.0	2,085	2,477	54.3	20,773	26,881	56.4
	DAYS	24,868	35,795	59.0	27,759	43,067	60.8	37,235	55,330	59.8	386,708	557,177	59.0
	ALOS	20.3	21.1		16.5	19.3		17.9	22.3		18.6	20.7	
Neuroses	SEPS	1,358	3,656	72.9	1,354	3,670	73.0	1,139	2,891	71.7	15,717	41,609	72.6
	DAYS	14,724	40,859	73.5	13,825	36,635	72.6	10,972	29,917	73.2	162,059	437,825	72.9
	ALOS	10.8	11.2		10.2	9.9		9.6	10.3		10.3	10.5	
Alc/Drug[2]	SEPS	1,162	419	26.5	2,006	676	25.2	1,911	718	27.3	21,625	7,688	26.2
	DAYS	8,506	3,795	30.9	13,061	4,798	26.9	14,007	5,257	27.3	161,655	61,072	27.4
	ALOS	7.3	9.1		6.5	7.1		7.3	7.3		7.5	7.9	
Other[3]	SEPS	383	734	65.7	457	877	65.7	620	1,044	62.7	6,338	11,279	64.0
	DAYS	3,970	7,957	66.7	5,034	10,161	66.9	9,226	18,851	67.1	82,558	147,947	64.2
	ALOS	10.4	10.8		11.0	11.6		14.9	18.1		13.0	13.1	
Total	SEPS	4,130	6,507	61.2	5,498	7,449	57.5	6,755	7,130	51.3	64,453	87,457	57.6
	DAYS	52,068	88,406	62.9	59,679	94,661	61.3	71,440	109,355	60.5	792,980	1,204,021	60.3
	ALOS	12.6	13.6		10.9	12.7		10.6	15.3		12.3	13.8	

[1] Figures reported for patients 15 years of age and older.

[2] Alcohol and drug related disorders.

[3] All other non-psychotic mental disorders.

support the observation by Richman and Harris (1982) that acute care hospitals tend to admit a disproportionate number of females with neurotic disorders.

An examination of the SEPRATE and DAYRATE distributions for males and females (Table 7) also revealed that utilization rates were consistently higher for females over time for all diagnoses, with the exception of ALC/DRUG disorders. Psychiatric SEPRATES for females with neuroses were more than twice the SEPRATES for males, and DAYRATES were almost two to three times higher for females than males. For ALC/DRUG disorders, SEPRATES for males were almost three times higher than the SEPRATES for females, and DAYRATES were more than twice as high for males than females.

With respect to age, the greatest proportion of psychiatric DAYS over the 12 year period were accounted for by the elderly (21.4%) but the largest proportion of SEPS were accounted for by the 25-34 year olds (20.5%). Thus, despite the fact that the elderly (65+ years of age) comprised only 9% to 10% of the adult population over time, proportionately they consumed more hospital resources in terms of patient days than the other age groups. The disproportionate use of health care resources by the elderly relative to their population numbers has long been recognized and is not an unexpected finding. It would also appear, however, that restrictive admission policies aimed at the elderly requring psychiatric

Table 7

Psychiatric SEPRATES and DAYRATES by Sex and Diagnosis

Diagnostic Category	Utilization Measure	1971 Males	1971 Females	1976 Males	1976 Females	1981 Males	1981 Females
Psychoses	SEPRATES	11.0	15.2	12.6	16.7	12.3	14.6
	DAYRATES	223.0	321.0	207.9	322.6	219.6	326.3
Neuroses	SEPRATES	12.2	32.8	10.1	27.5	6.7	17.0
	DAYRATES	132.0	366.5	103.6	274.4	64.7	176.4
Alc/Drug	SEPRATES	10.4	3.8	15.0	5.0	11.3	4.2
	DAYRATES	76.3	34.0	112.1	42.9	82.6	31.0
Other	SEPRATES	3.4	6.6	3.4	6.7	3.7	6.2
	DAYRATES	35.6	71.2	39.2	74.9	54.4	111.1

SEPRATES and DAYRATES per 10,000 person-years, 15 years of age and older.

Alcohol and drug disorders.

All other non-psychotic mental disorders.

treatment in acute care hospitals (Butler, 1975; Sadavoy, 1981) may not be as widely practiced in Alberta, if at all, as in other jurisdictions.

4.2.2 Utilization Trends by Bed Type and Diagnosis

A comparison of the SEPS, DAYS and ALOS distributions for hospitals with dedicated PSY beds and hospitals with MED beds only revealed distinctive patterns of utilization. As shown in Table 8, the proportion of SEPS across bed type remained approximately the same over time, but from 1974 to 1979/80, the number of SEPS from MED beds exceeded the number of SEPS from PSY beds by a slight margin. In contrast to the almost even distribution of SEPS between PSY beds and MED beds, the majority (about 65% to 75%) of psychiatric DAYS were consistently spent in PSY beds. Consequently, ALOS in PSY beds was twice that of the ALOS in MED beds during each year of the study period. However, ALOS did not vary substantially over time and averaged about 17 to 18 days in PSY beds and 7 to 9 days in MED beds. This latter finding is consistent with Cardillo's (1980) examination of national statistics.

In contrast to the general increase in SEPS and DAYS, utilization rates in PSY beds decreased over time (Table 9). Over the 12 year study period, SEPRATES and DAYRATES dropped by -16.6% and -12.9% respectively. A somewhat different trend was exhibited for MED beds. Although SEPRATES declined by -16.0% between 1971 and 1982/83, DAYRATES tended to fluctuate but showed an overall +8.9% increase during the same time period.

Table 8

Trends in Psychiatric SEPS, DAYS and ALOS by Bed Type:1971-1982/83[1]

	SEPS										
Year	Psy[2] Beds	Med[3] Beds	Total	% PSY Beds	Psy Beds	Med Beds	Total	% Psy Beds	Psy Beds	Med Beds	Total
1971	5,886	4,751	10,637	55.3	105,071	35,402	140,474	74.8	17.8	7.5	13.2
1972	6,595	5,295	11,890	55.5	122,905	41,246	164,151	74.9	18.6	7.8	13.8
1973	6,535	5,763	12,298	53.1	116,664	44,990	161,654	72.1	17.9	7.8	13.1
1974	6,700	6,773	13,473	49.7	112,037	49,953	161,990	69.2	16.7	7.4	12.0
1975	6,442	6,510	12,952	49.7	111,679	52,681	164,360	67.9	17.3	8.1	12.7
1976	6,287	6,660	12,947	48.6	107,722	49,473	157,195	68.5	17.1	7.4	12.1
1977	6,004	6,257	12,261	48.9	107,274	47,685	154,957	69.2	17.9	7.6	12.6
1978	6,390	6,818	13,208	48.4	110,494	54,794	165,288	66.8	17.3	8.0	12.5
1979/80	6,407	6,837	13,244	48.4	114,819	61,615	176,434	65.1	17.9	9.0	13.3
1980/81	6,329	6,138	12,467	50.8	119,088	51,586	170,674	69.8	18.8	8.4	13.7
1981/82	6,539	6,346	12,885	50.7	119,780	61,015	180,795	66.3	18.3	9.6	14.0
1982/83	7,530	6,118	13,648	55.1	140,061	58,966	199,027	70.3	18.6	9.6	14.6
TOTAL	77,644	74,266	151,910	51.1	1,387,595	609,406	1,997,001	69.4	17.9	8.2	13.1

[1] All figures reported for patients 15 years of age and older.

[2] Hospitals with dedicated psychiatric (PSY) beds.

[3] Hospitals without dedicated PSY beds.

[4] Average length of stay per patient SEP in days.

Table 9

Trends in Psychiatric SEPRATES and DAYRATES by Bed Type: 1971-1982/83

	SEPRATES			DAYRATES		
Year	Psy Beds	Med Beds	Total	Psy Beds	Med Beds	Total
1971	51.7	41.7	93.4	922.5	310.8	1233.3
1972	56.2	45.1	101.3	1046.5	351.2	1397.7
1973	53.8	47.4	101.2	960.5	370.4	1330.9
1974	53.4	53.9	107.3	892.6	398.9	1291.5
1975	49.6	50.2	99.8	860.5	405.9	1266.4
1976	46.8	49.6	96.4	802.3	368.5	1170.8
1977	42.8	44.7	87.5	765.6	640.3	1105.9
1978	43.7	46.6	90.3	755.3	374.6	1129.9
1979/80	41.9	44.8	86.7	751.6	403.3	1154.9
1980/81	39.7	38.6	78.3	746.2	323.2	1069.4
1981/82	39.2	38.0	77.2	718.2	365.8	1084.0
1982/83	43.1	35.0	78.3	803.2	338.1	1141.5

SEPRATES and DAYRATES per 10,000 person-years, 15 years of age and older.

As noted previously, during the early 1970s there was a steady increase in psychiatric SEPS from acute care hospitals. It would appear that this increase took place primarily in MED beds. As summarized in Table 10, between 1971 and 1976, SEPS from MED beds increased by 40.2% in comparison to only 6.8% in PSY beds. This trend reversed during 1976 to 1982/83; SEPS from MED beds dropped by approximately -8.1%, but increased by +19.7% for PSY beds. As 30 dedicated PSY beds were added to the hospital system from 1980/81 to 1982/83, this change in the utilization pattern would be expected. For the entire 12 year period, however, the overall increase in SEPS across bed type differed by less than 1 percent.

Psychiatric DAYS and ALOS also showed the largest percentage increase over time for MED beds. From 1971 to 1982/83, the percentage increase in MED bed DAYS (66.6%) was twice that of the increase in PSY bed DAYS (33.3%), and the percentage increase in ALOS was more than six times higher in MED beds (28.0%) than in PSY beds (4.5%).

Thus, despite the overall decrease in SEPRATES, these findings point towards the increasingly important role of the non-psychiatric ward in Alberta's hospitals for treating the mentally ill. The substantial difference in ALOS between PSY beds and MED beds would further suggest that the psychiatric service roles of hospitals in Alberta without dedicated PSY beds has been to treat patients with less severe mental disorders until discharge or possible

Table 10

Percentage Increase in SEPS and DAYS by Bed Type

Utilization Measure	1971-1976	1976-1982/83	1971-1982/83
All Beds			
SEPS	+21.7%	+ 5.4%	+28.3%
DAYS	+11.9%	+26.6%	+41.7%
ALOS	- 8.3%	+20.7%	+10.6%
Psy Beds			
SEPS	+ 6.8%	+19.7%	+27.9%
DAYS	+ 2.5%	+30.0%	+33.3%
ALOS	- 4.5%	+ 8.7%	+ 4.5%
Med Beds			
SEPS	+40.2%	- 8.1%	+28.7%
DAYS	+39.7%	+19.1%	+66.6%
ALOS	- 1.3%	+29.7%	+28.0%

Changes over the 1971-76 and 1971-82/83 period using 1971 as the base year.

Changes over the 1976-82/83 period using 1976 as the base year.

transfer to hospitals with PSY beds.

An examination of the distributions of SEPS, DAYS and ALOS over time by bed type and diagnosis, in fact, revealed that an average of 62.9% of the SEPS and 75.5% of the DAYS for patients with psychoses were accounted for by PSY beds (Table 11). Nonetheless, persons with psychotic disorders were treated in MED beds in Alberta's hospitals throughout the study period. The ALOS, however, tended to be almost twice as long in PSY beds (24 days) as in MED beds (13 days). The reason for this difference in ALOS was difficult to determine. The use of broad diagnostic categories may be one explanation. For example, patients with organic psychoses, whose ALOS may be considerably longer than the ALOS for patients with affective disorders, may be treated more often in PSY beds than in MED beds. By aggregating the utilization data for all psychotic disorders, this effect may be masked. Another possible explanation may be that the most severely ill patients are transferred from MED beds to PSY beds. Consequently, the ALOS in PSY beds would necessarily be longer than the ALOS in MED beds.

In contrast to the utilization patterns observed for patients with psychotic disorders, the majority of SEPS for the neuroses were consistently from MED beds. Further, the proportion of total SEPS from MED beds increased over the 12 years as the number of SEPS from PSY beds decreased by -21.8% between 1971 and 1982/83. The majority of DAYS, however, were consistently spent in PSY beds. As with

Table 11

Psychiatric SEPS, DAYS and ALOS by Bed Type and Diagnosis[1]

		1971			1976			1982/83			1971-1982/83		
Diagnostic Category	Utilization Indicator	Psy Beds	Med Beds	%Psy Beds	Psy Beds	Med Beds	%Psy Beds	Psy Beds	Med Beds	%Psy Beds	Psy Beds	Med Beds	%Psy Beds
Psychoses	SEPS	1,952	973	66.7	2,369	1,538	60.6	3,427	1,589	68.3	30,005	17,649	62.9
	DAYS	48,520	12,143	79.9	54,716	16,110	77.3	79,684	26,366	75.1	713,049	230,836	75.5
	ALOS	24.9	12.5		23.1	10.5		23.2	16.6		23.7	13.0	
Neuroses	SEPS	2,488	2,526	49.6	1,965	3,059	39.1	1,945	2,326	45.5	24,657	32,669	43.0
	DAYS	39,640	15,943	71.3	30,358	20,102	60.2	30,140	14,975	66.8	387,907	211,977	64.6
	ALOS	15.9	6.3		15.4	6.6		15.5	6.4		15.7	6.5	
Alc/Drug[2]	SEPS	815	766	51.5	1,115	1,567	41.2	965	1,522	38.8	12,303	17,010	41.9
	DAYS	7,901	4,400	64.2	10,406	10,283	50.3	10,014	9,853	50.4	119,163	103,564	53.5
	ALOS	9.7	5.7		9.3	6.6		10.4	6.5		9.7	6.1	
Other[3]	SEPS	631	486	56.4	838	496	62.8	1,193	681	63.6	10,679	6,938	60.6
	DAYS	9,011	2,916	75.6	12,242	2,978	80.4	20,223	7,772	72.2	167,476	63,029	72.6
	ALOS	14.3	6.0		14.6	6.0		17.0	11.4		15.7	9.1	
Total	SEPS	5,886	4,751	55.3	6,287	6,660	48.6	7,530	6,118	55.1	77,644	74,266	51.1
	DAYS	105,072	35,402	74.8	107,722	49,473	68.5	140,061	58,966	70.3	1,387,595	609,406	69.4
	ALOS	17.9	7.5		17.1	7.4		18.6	9.6		17.9	8.2	

[1] Figures reported for patients 15 years of age and older.

[2] Alcohol and drug related disorders.

[3] All other non-psychotic mental disorders.

SEPS, the proportion of total DAYS spent in PSY beds for the neuroses, dropped from 71.3% in 1971 to 66.8% in 1982/83 as the number of DAYS declined. Again, ALOS in PSY beds was more than twice as long as the ALOS in MED beds.

For ALC/DRUG disorders, SEPS and DAYS were higher in PSY beds than MED beds during 1971. Over time, however, hospitals without dedicated PSY beds began to play a more important role in treating these disorders. Consequently, by 1982/83, about 61% of the SEPS and 49% of the DAYS were accounted for by MED beds as opposed to PSY beds. The ALOS in MED beds for the entire 12 year period was less than one week as opposed to a 9 to 10 day average stay in PSY beds.

Although the majority of SEPS and DAYS for OTHER disorders were consistently spent in PSY beds, the number of DAYS spent in MED beds increased from 2,916 in 1971 to 7,772 in 1982/83, a jump of 166.5%. Similarly, the number of SEPS from MED beds increased by 40.1% from 486 in 1971 to 681 in 1982/83. Thus, while ALOS remained relatively stable at approximately 14 days in PSY beds, ALOS in MED beds almost doubled during this time period from 6 to 11.4 days per patient separation. The reason for this increase in utilization is not readily apparent from the data. It is possible that with the greater emphasis placed on the provision of psychiatric care at the community level, accessibility to psychiatric treatment in general hospitals improved for rural residents.

An examination of SEPRATES and DAYRATES by bed type and diagnosis over time revealed widely fluctuating trends over the first half (1971-1976) and second half (1976-1982/83) of the study period (Table 12). Table 13 summarizes the percentage change in utilization rates over time. The only steady trends which could be observed in the data were for PSY beds; specifically for the psychoses, the neuroses and OTHER disorders. Psychiatric SEPRATES for the psychoses and OTHER disorders exhibited a continuous increase over the first and second half of the study period, as did DAYRATES for OTHER disorders. In contrast, both SEPRATES and DAYRATES for the neuroses declined over time. From 1971 to 1982/83, however, the two most distinctive trends were: 1) the decrease in utilization rates for the neuroses in both PSY beds and MED beds, and 2) the decrease in utilization rates for ALC/DRUG disorders in PSY beds and the corresponding increase in utilization rates in MED beds.

Findings in the latter case, would suggest that the increasing use of acute care hospitals to treat persons with psychotic disorders following the deinstitutionalization movement resulted in the decreased use of PSY beds to treat patients with ALC/DRUG disorders. This change in the utilization pattern may have been compensated for by an increase in the use of MED beds for treating patients with ALC/DRUG disorders. The overall decrease in utilization rates for the neuroses, however, may have been in-

Table 12

Psychiatric SEPRATES and DAYRATES by Bed Type and Diagnosis[1]

Diagnostic Category	Utilization Indicator	1971 Psy Beds	1971 Med Beds	1976 Psy Beds	1976 Med Beds	1982/83 Psy Beds	1982/83 Med Beds	1971-82/83 Psy Beds	1971-82/83 Med Beds
Psychoses	SEPRATES	17.1	8.5	17.6	14.6	19.7	9.1	17.8	10.5
	DAYRATES	425.9	106.6	407.5	119.9	457.0	151.2	423.1	137.9
Neuroses	SEPRATES	21.8	22.2	14.6	22.8	11.1	13.3	14.7	19.5
	DAYRATES	348.0	139.9	226.1	149.7	172.9	85.8	229.7	126.8
Alc/Drug[2]	SEPRATES	7.2	6.7	8.3	11.7	5.5	8.7	7.3	10.1
	DAYRATES	69.4	38.6	77.5	76.6	57.4	56.5	70.5	61.8
Other[3]	SEPRATES	5.5	4.3	6.2	3.7	6.8	3.9	6.3	4.1
	DAYRATES	79.1	25.6	91.2	22.2	115.9	44.6	99.3	37.8

[1] SEPRATES and DAYRATES per 10,000 person-years, 15 years of age and older.

[2] Alcohol and drug related disorders.

[3] All other non-psychotic mental disorders.

Table 13

Percentage Change in Psychiatric SEPRATES and DAYRATES by Bed Type and Diagnosis

Diagnostic Category/ Utilization Measure	PSY Beds 1971-76[1]	PSY Beds 1976-82/83[2]	PSY Beds 1971-82/83[1]	MED Beds 1971-76[1]	MED Beds 1976-82/83[2]	MED Beds 1971-82/83[1]
Psychoses						
SEPRATES	+ 2.9%	+11.9%	+15.2%	+71.8%	-37.6%	+ 7.1%
DAYRATES	- 4.3%	+12.1%	+ 7.3%	+12.5%	+26.1%	+41.8%
Neuroses						
SEPRATES	-33.0%	-23.9%	-49.9%	+ 2.7%	-41.6%	-40.9%
DAYRATES	-35.0%	-23.5%	-50.3%	+ 7.0%	-42.9%	-38.6%
Alc/Drug[3]						
SEPRATES	+15.3%	-33.7%	-23.6%	+74.6%	-25.6%	+29.8%
DAYRATES	+11.7%	-25.9%	-17.3%	+98.2%	-26.2%	+46.3%
Other[4]						
SEPRATES	+12.7%	+ 9.6%	+23.6%	-13.9%	+ 5.4%	- 9.3%
DAYRATES	+15.3%	+27.0%	+46.5%	-13.3%	+100.9%	+74.2%

[1] Percentage change using 1971 as base year.

[2] Percentage change using 1976 as base year.

[3] Alcohol and drug related disorders.

[4] All other non-psychotic mental disorders.

fluenced by the use of outpatient mental health care services. This would be consistent with the findings in other studies (Bachrach, 1975; LaFave & Vandenham, 1979; Moran, 1979) as well as the increased use of psychiatric outpatient services in Alberta (71%) between 1976 and 1981/82.

4.2.3 Summary of Findings

The results of the provincial analyses yielded the following major findings:

1. From 1971 to 1974, psychiatric SEPRATES in Alberta increased and then steadily declined during the remainder of the study period. Psychiatric DAYRATES fluctuated from year to year but showed an overall decline of approximately 7.5% from 1971 to 1982/83. As SEPRATES dropped at a higher rate than DAYRATES, the ALOS showed a gradual increase during the latter half of the study period from 12 to 14 days.
2. Over time, females experienced higher SEPRATES, DAYRATES and ALOS for psychiatric disorders than did males. This finding was consistent for the psychoses, neuroses, and OTHER disorders. Males, however, consistently experienced higher SEPRATES, DAYRATES and ALOS for ALC/DRUG disorders.
3. Alberta's elderly population (65+ years) accounted for the greatest proportion of psychiatric DAYS over time despite comprising only 9% to 10% of the adult population (15+ years). Persons 25 to 34 years of age, however,

accounted for the greatest proportion of psychiatric SEPS in the population.

4. Over the 12 year study period, SEPRATES from MED beds and PSY beds were approximately equivalent; psychiatric DAYRATES and ALOS, however, tended to be twice as high in PSY beds as in MED beds. Further, utilization rates in PSY beds were higher for the psychoses and OTHER disorders, whereas utilization rates for the neuroses and ALC/DRUG disorders tended to be higher in MED beds.

4.3 Regional Patterns of Utilization

In the following subsections, patterns of hospital utilization were examined for each mental health care REG during the census years: 1971, 1976 and 1981. As discussed in subsection 3.3.2, the regional configuration of GHDs was based on the boundaries developed by the Departments of Hospitals and Medical Care and Social Services and Community Health. The data reflect the hospital utilization patterns of residents in each REG irrespective of where they were hospitalized in the province for psychiatric care. Consequently, the regional analyses were conducted from a community-based (CB) perspective.

The first set of analyses examined the distribution of SEPS and DAYS, for all psychiatric disorders, among the REGs and compared these data to the regional SEPRATE and DAYRATE distributions over time. The second set of analyses compared regional DAYRATES and SEPRATES for the entire 12 year study period and indexed these rates to the provincial average. Finally, regional comparisons were made for ALOS over time. The results of these analyses were intended to provide information on the relative consumption of hospital resources for psychiatric disorders among the regions. All references to areas in the discussion (e.g. Edmonton, Medicine Hat, etc.) related to the broad REG and not to the city or hospital district, unless otherwise noted.

4.3.1 Total Utilization Trends

Tables 14 and 15 provide detailed information on regional utilization patterns over time for all psychiatric diagnoses combined. From Table 14, it can be seen that the greatest proportion of psychiatric DAYS and SEPS were consistently accounted for by residents in the metropolitan REGs of Edmonton and Calgary. This was an expected finding as both the Edmonton and Calgary hospital districts contained the largest populations and also the greatest number of hospitals. Similarly, the central Red Deer REG, with the next highest number of residents, accounted for a greater proportion of the DAYS and SEPS over time than the northern and southern REGs. In contrast, residents of Medicine Hat, the smallest REG in terms of land area and population, accounted for the fewest DAYS and SEPS over time.

It can also be seen from Table 14 that, with the exception of Medicine Hat (-2.5%), there was a net

Table 14

Regional SEPS and DAYS for Selected Years[1]

Area	Indicator	1971	% of Provincial Total	1976	% of Provincial Total	1981	% of Provincial Total	% Change in[2] REG Total 1971-1981	% Change in[2] Provincial Total 1971-1981
Alta.	SEPS	10,652	(100.0)	12,977	(100.0)	12,916	(100.0)		(+21.3)
	DAYS	140,707	(100.0)	157,665	(100.0)	181,262	(100.0)		(+28.8)
Metro.									
Edm.	SEPS	2,755	(25.9)	3,538	(27.4)	3,083	(23.9)	+11.9	(- 7.7)
	DAYS	43,463	(30.9)	52,936	(33.6)	51,412	(28.5)	+18.3	(- 7.8)
Calg.	SEPS	2,882	(27.1)	2,747	(21.2)	2,915	(22.6)	+ 1.1	(-16.6)
	DAYS	47,697	(34.0)	45,043	(28.6)	50,977	(28.2)	+ 6.9	(-17.1)
Central									
Red Dr.	SEPS	1,738	(16.3)	2,092	(16.1)	2,169	(16.8)	+24.8	(- 3.1)
	DAYS	17,136	(12.2)	19,053	(12.1)	28,365	(15.6)	+65.5	(+27.8)
North									
Ft. Mc.	SEPS	1,068	(10.1)	1,627	(12.5)	1,595	(12.3)	+49.3	(+21.8)
	DAYS	8,571	(6.1)	13,142	(8.3)	19,105	(10.5)	+122.9	(+72.1)
Gr. Pr.	SEPS	931	(8.7)	1,197	(9.2)	1,393	(10.8)	+49.6	(+24.1)
	DAYS	8,226	(5.8)	9,339	(5.9)	12,157	(6.7)	+47.8	(+15.5)
South									
Leth.	SEPS	803	(7.5)	1,160	(8.9)	1,182	(9.1)	+47.2	(+21.3)
	DAYS	9,394	(6.7)	11,810	(7.5)	13,183	(7.2)	+40.3	(+ 7.5)
Med. Ht.	SEPS	475	(4.4)	616	(4.7)	579	(4.5)	+21.9	(+ 2.3)
	DAYS	6,220	(4.3)	6,332	(4.0)	6,063	(3.3)	- 2.5	(-23.3)

[1] SEPS and DAYS for persons 15 years of age and older.

[2] Percentage change using 1971 as the base year.

Table 15

Regional SEPRATES and DAYRATES for Selected Years[1]

Area	Indicator	1971	(Rank)	1976	(Rank)	1981	(Rank)	% Change[2] 1971-1981
Alberta	Seprate	93.4		96.4		77.2		-17.3
	Dayrate	1233.4		1170.8		1084.0		-12.1
Metro								
Edmonton	Seprate	72.7	(7)	77.1	(6)	54.2	(7)	-25.4
	Dayrate	1146.6	(4)	1154.0	(5)	904.1	(7)	-21.1
Calgary	Seprate	90.6	(6)	69.7	(7)	57.3	(6)	-36.8
	Dayrate	1495.5	(1)	1143.6	(6)	1001.4	(6)	-33.0
Central								
Red Deer	Seprate	111.8	(3)	122.4	(4)	105.6	(4)	- 5.5
	Dayrate	1102.5	(5)	1114.9	(7)	1380.9	(2)	25.3
North								
Ft. McMurray	Seprate	126.2	(2)	173.6	(1)	136.3	(2)	8.0
	Dayrate	1012.8	(7)	1402.1	(1)	1632.5	(1)	61.2
Grande Prairie	Seprate	131.8	(1)	152.2	(2)	142.4	(1)	8.0
	Dayrate	1164.5	(3)	1187.5	(4)	1242.8	(3)	6.7
South								
Lethbridge	Seprate	92.2	(5)	117.9	(5)	106.4	(3)	15.4
	Dayrate	1078.2	(6)	1200.9	(3)	1187.0	(4)	10.0
Medicine Hat	Seprate	107.4	(4)	127.2	(3)	98.4	(5)	- 8.4
	Dayrate	1413.0	(2)	1307.5	(2)	1030.8	(5)	-27.0

[1] SEPRATES and DAYRATES per 10,000 persons, 15 years of age and older.

[2] Percentage change using 1971 as the base year.

increase in the number of psychiatric DAYS generated by residents in each REG between 1971 and 1981, although this varied among the REGs. For example, the largest increase in DAYS was experienced by residents of the Ft. McMurray REG (122.9%) while residents in the Edmonton and Calgary REGs experienced a net increase of only 18.3% and 6.9% respectively in DAYS over time. At the same time, the proportion of total DAYS accounted for by residents in Edmonton (-7.8%) and Calgary (-17.1%) exhibited an overall decline from 1971 to 1981, while the proportion of total DAYS accounted for by residents of all other REGs (except Medicine Hat) showed a net increase. A similar pattern was observed for psychiatric SEPS among the REGs. That is, residents of Edmonton and Calgary consistently accounted for the highest number of SEPS. Also, there was a net increase in the number of SEPS by residents in each REG over time. However, there was a net decrease in the proportion of total SEPS experienced by residents in Edmonton (-7.7%) and Calgary (-16.6%) over time, while the proportion of total SEPS by residents in the northern, central and southern REGs exhibited a net increase over time.

While the above analyses may provide an indication of the proportionate distribution of psychiatric DAYS and SEPS among the REGs, the results were influenced by the size and demographic composition of the regional populations and changes to the population over time. To get a more precise indication of resource use by residents in each REG, hospital utilization patterns were compared on an age-sex adjusted per capita basis.

As demonstrated in Table 15, the results of this analysis revealed very different hospital utilization patterns. On an age-sex adjusted per capita basis, residents of the Edmonton and Calgary REGs utilized fewer psychiatric DAYS over time than residents of the other REGs. Most apparent was the change in utilization patterns for residents of the Ft. McMurray REG. In 1971, for example, the Ft. McMurray DAYRATE was the lowest among the REGs. In 1976 and 1981, however, residents of the Ft. McMurray REG exhibited the highest use of hospitals for psychiatric disorders in terms of DAYS per capita. The rise in DAYRATES may have been influenced by several factors: the increased use of acute care hospitals for treating the mentally ill, the lack of alternative mental health services in the REG, as well as the opening of a psychiatric unit in the Ft. McMurray hospital. Similarly, residents of the Medicine Hat REG had the fewest number of actual DAYS and SEPS over time. However, in 1971 and 1976, DAYRATES for Medicine Hat residents were second highest among the REGs. On a per capita basis, therefore, residents of Medicine Hat utilized more hospital resources for psychiatric disorders than residents in the Edmonton and Calgary REGs during those years.

The pattern for SEPRATES was similar in that Edmonton and Calgary REG residents consistently experienced the lowest number of SEPS per capita despite having the highest number of actual SEPS over time. From Table 15 it can be seen that the highest SEPRATES over time were experienced by residents in the northern REGs. Consequently, in 1976 and 1981, residents of the Ft. McMurray REG exhibited the greatest use of hospitals for psychiatric disorders in terms of DAYS and SEPS per capita.

This pattern can be seen most clearly in Table 16 which provides data for the 12 year regional DAYRATES and SEPRATES, as well as the 12 year average indexed to the provincial rate. Over the entire 12 year study period, residents of the Ft. McMurray REG consumed the most hospital resources in terms of psychiatric DAYS per 10,000 persons. DAYRATES for the Ft. McMurray residents were 27.6% higher than DAYRATES for Edmonton regional residents and 21.2% higher than DAYRATES for Calgary regional residents. In comparison with the province as a whole, DAYRATES for residents of the Ft. McMurray REG were 20.4% higher during the entire 12 year period. On a per capita basis, residents of the southern REGs also spent more psychiatric DAYS in hospital than Edmonton and Calgary regional residents during the 12 years, and were respectively 7.9% (Lethbridge) and 7.4% (Medicine Hat) above the 12 year provincial psychiatric DAYRATE.

Residents of the northern REGs also experienced the

Table 16

Indexed SEPRATES and DAYRATES by REG

Area/ Region	SEPRATES Actual	SEPRATES Indexed	SEPRATES %	DAYRATES Actual	DAYRATES Indexed	DAYRATES %
Alberta	90.3	100.0	-	1187.1	100.0	-
Metro						
Edmonton	68.8	76.1	-23.9	1120.1	94.3	-5.7
Calgary	70.1	77.6	-22.4	1179.2	99.3	-0.7
Central						
Red Deer	116.4	128.9	+28.9	1196.5	100.8	+0.8
North						
Ft.McMurray	153.8	170.3	+70.3	1429.1	120.4	+20.4
Grande Prairie	144.8	160.4	+60.4	1201.9	101.5	+1.5
South						
Lethbridge	111.3	123.2	+23.2	1280.9	107.9	+7.9
Medicine Hat	116.9	129.4	+29.4	1274.8	107.4	+7.4

SEPRATES and DAYRATES reported for all 12 years combined (1971-1982/83), for persons 15 years of age and older.

Percentage above or below the provincial index (100.0%).

highest SEPRATES during the 12 year study period, and were 70.3% (Ft. McMurray) and 60.4% (Grande Prairie) above the provincial average. Conversely, residents of the metro REGs experienced the lowest number of psychiatric SEPS on a per capita basis and were -23.9% (Edmonton) and -22.4% (Calgary) below the 12 year provincial average.

While residents of the Edmonton and Calgary REGs consumed the fewest hospital resources for psychiatric disorders on a per capita basis, they experienced the longest ALOS over time (Table 17). In 1971, for example, Edmonton and Calgary residents remained in hospital almost twice as long as residents in the northern REGs, and approximately 60% longer than residents in the Red Deer REG (9.9 days). By 1981, this pattern changed somewhat as the ALOS in the Ft. McMurray (11.9 days) and Red Deer REGs (13.1 days) increased by 48.8% and 32.3% respectively in comparison to an approximate increase of 6% in the Edmonton (16.7 days) and Calgary (17.5 days) REGs. The increase in ALOS in the Ft. McMurray and Red Deer REGs may have been related to the opening of psychiatric units in the Ft. McMurray and Red Deer district hospitals, thereby enabling patients with more serious disorders to be treated. Nonetheless, ALOS for residents in the Edmonton and Calgary REGs remained above the provincial average by about 20% to 25% over time.

In summary, the results of the regional analyses indicated that residents of the Edmonton and Calgary REGs

Table 17

Regional ALOS for Selected Years

Areas		Years		% Change
	1971	1976	1981	1971 - 1981[1]
Alberta	13.2	12.1	14.0	+ 6.0
Metro				
Edmonton	15.8	14.9	16.7	+ 5.6
Calgary	16.6	16.4	17.5	+ 5.4
Central				
Red Deer	9.9	9.1	13.1	+32.3
North				
Fort McMurray	8.0	8.1	11.9	+48.8
Grande Prairie	8.8	7.8	8.7	- 1.1
South				
Lethbridge	11.7	10.1	11.2	- 4.2
Medicine Hat	13.1	10.3	10.5	-19.8

[1] Percentage change using 1971 as the base year.

experienced the highest number of psychiatric SEPS and DAYS over time as well as the longest ALOS. However, on an age-sex adjusted per capita basis, residents of the Edmonton and Calgary REGs consumed the fewest hospital resources for psychiatric care when compared with residents of the southern REGs and the northern REGs, most notably Ft. McMurray regional residents. Possible explanations for these findings may be associated with the lesser availability of alternative mental health care services outside of the metropolitan Edmonton and Calgary REGs. Although the availability of alternative mental health care services has been associated with decreasing the ALOS for psychiatric patients elsewhere (Moran, 1980), residents of the Edmonton and Calgary REGs experienced a longer ALOS than did residents of other REGs. The longer ALOS experienced by residents in the metro REGs, however, may be associated with the greater number of dedicated PSY beds located in Edmonton and Calgary district hospitals and the selective admission of patients with more serious disorders (e.g. psychoses) to hospitals with PSY beds.

4.3.2 Summary of Findings

The results of the regional analyses yielded the following major findings:

1. Residents of the Edmonton and Calgary mental health care REGs tended to consume the fewest hospital resources (SEPRATES and DAYRATES) for psychiatric disorders on an age-sex adjusted per capita basis; however, they

experienced the longest ALOS of all regional residents.

2. Residents of the northern REGs, Ft. McMurray and Grande Prairie, tended to experience the highest SEPRATES over time. The highest DAYRATES also tended to be experienced by Ft. McMurray regional residents.

3. The 12 year indexed utilization rates indicated that Edmonton and Calgary regional residents were respectively -23.9% and -22.3% below the provincial SEPRATE, and -5.7% and -0.7% below the provincial DAYRATE. In comparison, residents of the Ft. McMurray REG were +70.3% above the provincial SEPRATE and +20.4% above the provincial DAYRATE.

4.4 Patient Origin-Destination Analyses

In the following section, psychiatric patient origin-destination flow patterns were examined for districts and hospitals containing PSY beds, districts and hospitals containing only MED beds, and for mental health care REGs. Results of the patient origin-destination analyses are presented from both a community-based (CB) and provider-based (PB) perspective. All references made to PSY bed and MED bed GHDs (districts) or hospitals indicated the presence or absence of short-term psychiatric beds in a given area. Thus, the terms "PSY bed GHDs" or "PSY bed hospitals" denote the presence of a psychiatric unit; the terms "MED bed GHDs" or "MED bed hospitals" denote those areas and facilities which did not contain a psychiatric unit during the course of the study period.

4.4.1 Community-Based Perspective - Relevance Indices

The CB origin-destination analyses examined: 1) service-specific hospital utilization patterns by bed type (PSY beds vs. MED beds) during 1971, 1982/83 and for all years combined (1971-1982/83), 2) origin-destination patterns by mental health care REG for all years combined, and 3) origin-destination utilization patterns for district residents in each REG to Edmonton or Calgary hospitals with dedicated PSY beds.

The results of the first analysis provide an estimate of the tendency for residents of MED bed GHDs to remain within or leave their own district to obtain care in a PSY bed district hospital. Relevance indices (RIs) were also derived for PSY bed district residents to their own district hospitals as well as MED bed district hospitals. The results of the second analysis indicates the degree to which residents in each mental health care REG remained within or travelled to another REG to receive psychiatric hospital care. Finally, the results of the third analysis examined the tendency for district residents in each REG to remain within their home REG or utilize resources in Edmonton or Calgary district hospitals with dedicated PSY beds.

Bed Type

An examination of patient flow patterns by bed type revealed that although the majority of psychiatric patients received hospital care in their own districts, residents of PSY bed GHDs received a higher percentage of psychiatric hospital services (DAYS and SEPS) within their home district than did residents of MED bed GHDs. An examination of the RIs for all years and all diagnoses combined (Table 18) showed that residents of PSY bed GHDs experienced 94.8% of their hospital DAYS and 90.9% of their SEPS within their district of origin. In comparison, residents of MED bed GHDs experienced 70.1% of their hospital DAYS and 85.0% of their SEPS within their own district hospitals. This pattern of utilization did not change substantially over time. In 1971, for example, residents of PSY bed GHDs spent 97.1% of their hospital DAYS within their own district which was 30% higher than the percentage of DAYS residents of MED bed GHDs (67.1%) spent in their district hospitals. Consequently, residents of MED bed GHDs spent 32.9% of all their hospital DAYS outside their home district to receive care in dedicated PSY beds. In 1982/83, residents of MED bed GHDs only spent an additional 5.9% of their psychiatric hospital DAYS within their district of origin (71.1%) and 28.9% of their hospital days in PSY bed GHDs. In contrast, the percentage of DAYS residents of PSY bed GHDs spent within their district of origin remained essentially the same over the 12 year period at about 97 percent.

This was not an unexpected finding as the results of similar studies (Joseph & Boeckh, 1981; McGuirk & Porell, 1984; Mellsop, 1969) showed that the severity of illness

Table 18

District RIs and ALOS by Bed Type and Diagnosis for Selected Years

District/ Origin	Diagnostic Category	Hospital/District Destination					
		1971		1982/83		1971-1982/83	
		Hos. with PSY Beds [1]	Hos. with MED Beds [2]	Hos. with PSY Beds [1]	Hos. with MED Beds [2]	Hos. with PSY Beds [1]	Hos. with MED Beds [2]
GHDS with PSY beds [1] % DAYS	Total	97.1	2.9	97.2	2.8	94.8	5.2
	Psychoses	97.6	2.4	98.3	1.7	95.7	4.3
	Neuroses	97.4	2.6	95.8	4.2	95.5	4.5
	Alc/Drug	93.9	6.1	91.4	8.6	89.6	10.4
	Other	96.1	3.9	98.0	2.0	93.5	6.5
GHDS with MED beds [2] % DAYS	Total	32.9	67.1	28.9	71.1	29.9	70.1
	Psychoses	40.3	59.1	33.6	66.4	37.2	62.8
	Neuroses	28.8	71.2	28.2	71.8	26.0	74.0
	Alc/Drug	11.3	88.7	12.1	91.6	11.7	88.3
	Other	42.2	57.8	29.0	71.0	36.3	63.7
GHDS with PSY beds [1] % SEPS	Total	93.4	6.6	92.8	7.2	90.9	9.1
	Psychoses	95.9	4.1	95.8	4.2	94.2	5.8
	Neuroses	93.3	6.7	91.0	9.0	89.8	10.2
	Alc/Drug	90.1	9.9	85.6	14.4	84.9	15.1
	Other	91.1	8.9	93.8	6.2	92.3	7.7
GHDS with MED beds [2] % SEPS	Total	15.0	85.0	17.0	83.0	15.0	85.0
	Psychoses	23.3	76.7	27.2	72.8	23.5	76.5
	Neuroses	12.1	87.9	12.9	87.1	11.4	88.6
	Alc/Drug	8.4	91.6	7.5	92.5	7.7	92.3
	Other	20.2	79.8	21.9	78.1	22.8	77.2

[1] Hospitals and/or GHDS which contain PSY beds.

[2] Hospitals and/or GHDS which contain only MED beds.

and the level of care required were important factors influencing patient flow patterns. Consequently, from Table 18, it can also be seen that over the 12 year period, residents of MED bed GHDs requiring hospital care for psychotic disorders spent 37.2% of their hospital DAYS in PSY bed GHDs compared to 26% for the neuroses and 11.7% for ALC/DRUG disorders. Interestingly, residents of MED bed GHDs spent an almost equivalent percentage of DAYS in PSY beds for psychotic disorders and OTHER non-psychotic disorders (36.3%). The reason for this was not immediately apparent from the data, nor was it an expected finding. It may be possible that patients with personality disorders, for example, who were included in the OTHER diagnostic category, required treatment in hospitals with psychiatric units. Again, the grouping of diagnosis codes into broad categories can mask important distinctions in hospital utilization patterns for various patient groups. This would suggest that further study at a more detailed level would be required before any explanations could be offered for the above finding. With the exception of OTHER disorders, however, it appeared that the tendency for residents of MED bed GHDs to travel to hospitals with PSY beds decreased as the severity of their illness decreased.

While the majority of residents in Alberta remained within their home district to receive psychiatric hospital care, residents of MED bed GHDs who were required to leave their district to receive care in PSY beds experienced a longer ALOS, irrespective of diagnosis, than did residents of PSY bed GHDs (Table 19). Thus for residents of MED bed GHDs, their ALOS in PSY beds for all diagnoses combined tended to be 11 days longer (19.4 days) than their ALOS in MED beds (8.0 days). When the ALOS experience of MED bed district residents was examined by diagnostic category, it was found that their ALOS in PSY beds tended to be twice as long for psychotic disorders (24 days in PSY beds), neurotic disorders (17.7 days in PSY beds), and other disorders (16.6 days) than their ALOS in MED beds for these disorders. For ALC/DRUG disorders, however, their ALOS in PSY beds was 9.6 days compared to 6.0 days in MED beds (approximately 60% rather than 100% or more longer).

These findings may again be attributed to the severity of illness which would require residents of MED bed GHDs to obtain care in PSY beds, and, therefore, result in longer hospital stays. However, with the exception of ALC/DRUG disorders, patients treated in PSY beds from MED bed districts also experienced a longer ALOS for the psychoses, neuroses and OTHER disorders than did patients who resided in PSY bed GHDs and received their hospital care within the district. The possibility that fewer alternative mental health care services (which could provide supportive aftercare for discharged patients) were available to residents of MED bed districts than to

Table 19

District ALOS by Bed Type and Diagnosis for Selected Years

		Hospital/District of Destination					
		1971-1982/83		1971		1982/83	
District of Origin	Diagnostic Category	Hos. with PSY Beds[1]	Hos. with MED Beds[2]	Hos. with PSY Beds[1]	Hos. with MED Beds[2]	Hos. with PSY Beds[1]	Hos. with MED Beds[2]
GHDs with PSY Beds[1]	Total	17.5	9.7	17.4	7.3	18.4	6.9
	Psychoses	23.6	17.4	24.4	14.0	23.2	9.4
	Neuroses	15.2	6.4	15.5	5.6	15.2	6.8
	Alc/Drug	9.6	6.2	9.8	5.8	10.3	5.7
	Other	15.4	12.8	13.6	5.6	16.8	5.2
GHDS with MED Beds[2]	Total	19.4	8.0	20.7	7.4	19.5	9.9
	Psychoses	24.3	12.6	27.5	12.4	23.3	17.2
	Neuroses	17.7	6.5	18.6	6.4	16.9	6.4
	Alc/Drug	9.6	6.0	7.9	5.7	11.2	6.5
	Other	16.6	8.6	17.5	6.0	17.7	12.1

[1] Hospitals and/or districts which contain PSY beds.

[2] Hospitals and/or districts which contain only MED beds.

residents of PSY bed GHDs may have been influential in delaying their hospital discharge and increasing their ALOS. As found by Moran (1980), the availability of alternative services tended to reduce ALOS for psychiatric patients in acute care hospitals, particularly for patients with more serious disorders.

Mental Health Care Regions

As expected, the results of the regional origin-destination analyses, as shown in Table 20, revealed that most psychiatric patients tended to be treated in hospitals located within their own REG. However, when they did travel outside their own mental health care REG to receive hospital care, the tendency was to utilize hospital facilities in the Edmonton and Calgary REGs (i.e. Edmonton or Calgary district hospitals) where the majority of PSY beds and specialized services were located.

The RIs for SEPS showed that residents of the Ft. McMurray REG were required to leave their REG for psychiatric care more often than residents of other REGs and, as expected, they tended to utilize Edmonton REG hospitals (RI 12%) more often than Calgary REG hospitals (RI .2%). Residents of the Grande Prairie and Red Deer REGs, who were required to seek psychiatric hospital care outside their REG, also tended to utilize Edmonton REG hospitals more frequently than Calgary REG hospitals. Residents of the Medicine Hat and Lethbridge REGs, however, tended to utilize Calgary REG hospitals (RIs of 6.7%) rather than Edmonton REG hospitals (RIs of .8% and .6% for Medicine

Table 20

Regional RIs and ALOS: 1971-1982/83[1]

Utilization Measure	REG of Origin	Hospital (REG) of Destination Edm.	Calg.	Red Deer	Ft. Mc.	Gr. Pr.	Med. Ht.	Leth.
% DAYS	Edmonton	97.8	0.5	0.5	0.6	0.4	0.0	0.1
	Calgary	0.5	98.5	0.4	0.0	0.0	0.2	0.4
	Red Deer	13.3	8.1	77.6	0.6	0.1	0.1	0.1
	Ft. McMurray	24.4	0.3	0.3	74.8	0.3	0.0	0.0
	Grande Prairie	19.6	0.8	0.2	0.5	78.9	0.0	0.0
	Medicine Hat	2.0	11.3	0.7	0.0	0.1	83.0	3.0
	Lethbridge	2.0	10.1	0.1	0.0	0.0	0.2	87.7
% SEPS	Edmonton	95.1	0.6	1.3	1.6	1.2	0.1	0.1
	Calgary	0.6	96.8	1.0	0.1	0.1	0.5	0.8
	Red Deer	7.3	3.9	87.4	0.7	0.3	0.1	0.2
	Ft. McMurray	12.0	0.2	0.4	86.8	0.5	0.0	0.1
	Grande Prairie	8.7	0.4	0.3	0.6	89.9	0.0	0.1
	Medicine Hat	0.8	6.7	0.8	0.1	0.2	88.9	2.4
	Lethbridge	0.6	6.7	0.2	0.0	0.0	0.3	92.2
ALOS	Edmonton	16.7	15.1	5.5	6.4	6.4	3.5	8.2
	Calgary	14.2	17.1	4.3	3.1	6.2	5.9	9.0
	Red Deer	18.6	21.2	3.9	7.9	9.1	10.1	6.7
	Ft. McMurray	18.9	12.9	5.7	8.0	6.0	3.5	3.2
	Grande Prairie	18.7	18.4	7.3	6.7	5.5	2.0	3.9
	Medicine Hat	26.6	18.3	4.8	3.2	8.6	10.2	13.4
	Lethbridge	39.6	17.3	8.8	5.0	5.0	7.2	10.9

[1] Figures reported for all 12 years combined, for persons 15 years of age and older.

Hat and Lethbridge residents respectively).

The use of hospitals in the Edmonton and Calgary REGs by non-regional residents, in terms of DAYS, was highest for residents of the Ft. MacMurray REG, followed by residents of the Red Deer, Grande Prairie, Lethbridge and Medicine Hat REGs in descending order. That is, the RIs for DAYS of regional residents to their own area hospitals were lowest for residents of the Ft. McMurray REG (74.8%) and highest for residents of the Medicine Hat REG (87.7%). Thus, residents of the southern REGs, which contained dedicated PSY beds throughout the study period, utilized fewer psychiatric hospital resources outside their REG than did residents of the northern and central REGs which did not open psychiatric units until 1980/81.

As illustrated in Figures 3 and 4, however, the degree to which district residents in each of the mental health care REGs utilized Edmonton and Calgary district hospitals for psychiatric care showed a considerable degree of variation. A comparison of Figures 3 and 4 immediately shows that the service population for Edmonton hospitals was geographically more widespread than was the service population for Calgary hospitals. Also, within each REG there were exceptions to the distance decay effect being operative. This was an expected finding as the influence of time and distance from hospitals have been found to exert a weaker influence on patterns of hospital utilization for patients who are severely ill and

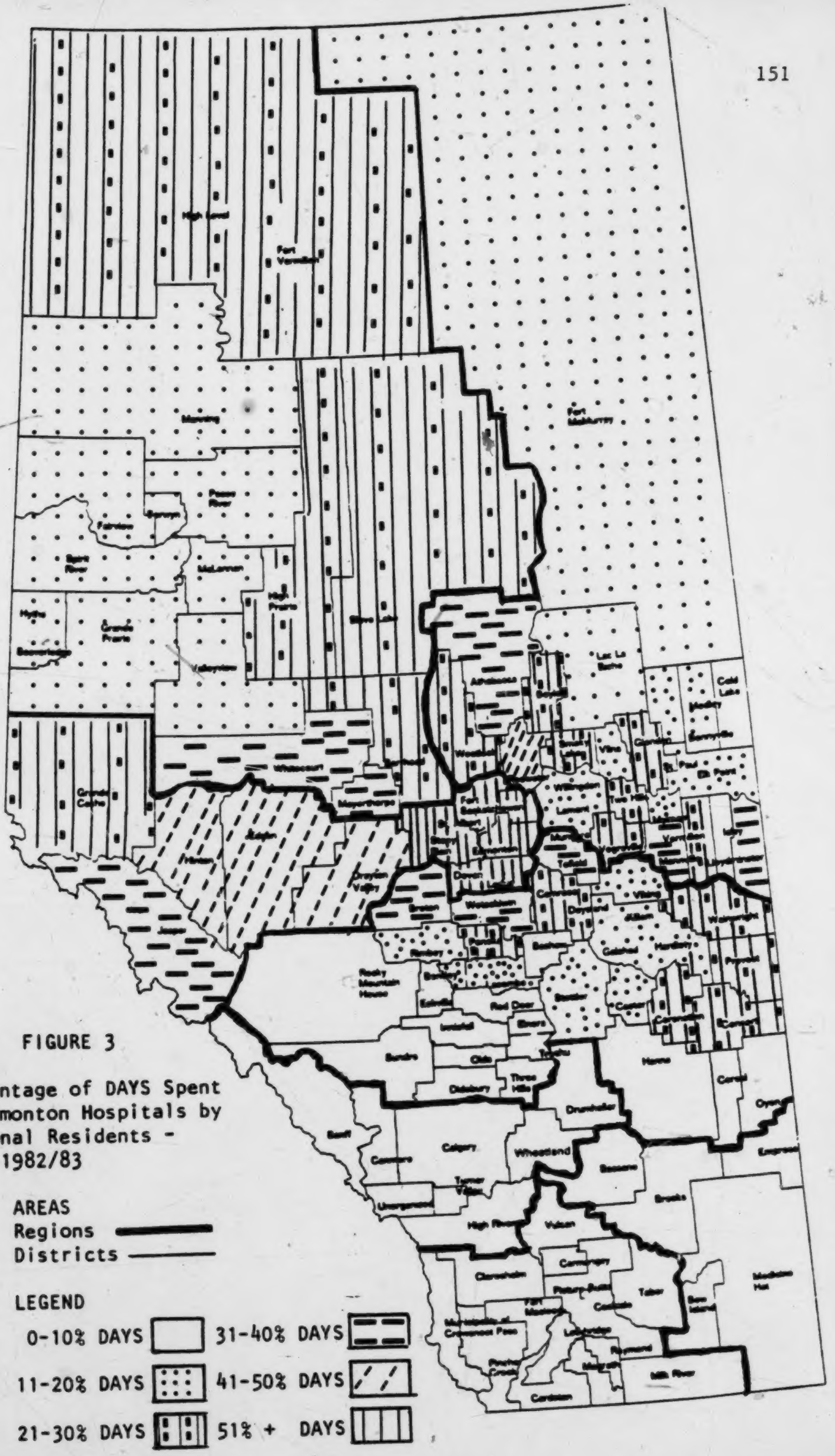

High Level
Fort Vermilion
Fort McMurray
Manning
Peace River
Fairview
Spirit River
McLennan
High Prairie
Slave Lake
Hythe
Beaverlodge
Grande Prairie
Valleyview
Athabasca
Lac La Biche
Cold Lake
Bonnyville
St. Paul
Elk Point
Whitecourt
Mayerthorpe
Grande Cache
Hinton
Edson
Jasper
Drayton Valley
Fort Saskatchewan
Vegreville
Vermilion
Wainwright
Camrose
Viking
Rocky Mountain House
Red Deer
Stettler
Castor
Coronation
Olds
Didsbury
Three Hills
Drumheller
Hanna
Consort
Oyen
Banff
Canmore
Calgary
Wheatland
Bassano
Brooks
Turner Valley
High River
Vulcan
Claresholm
Taber
Medicine Hat
Bow Island
Municipality of Crowsnest Pass
Pincher Creek
Fort Macleod
Lethbridge
Raymond
Cardston
Milk River

FIGURE 3

Percentage of DAYS Spent in Edmonton Hospitals by Regional Residents - 1971-1982/83

AREAS
Regions ━━━
Districts ───

LEGEND

0-10% DAYS	☐	31-40% DAYS	▤
11-20% DAYS	⁘	41-50% DAYS	▧
21-30% DAYS	▥	51% + DAYS	▥

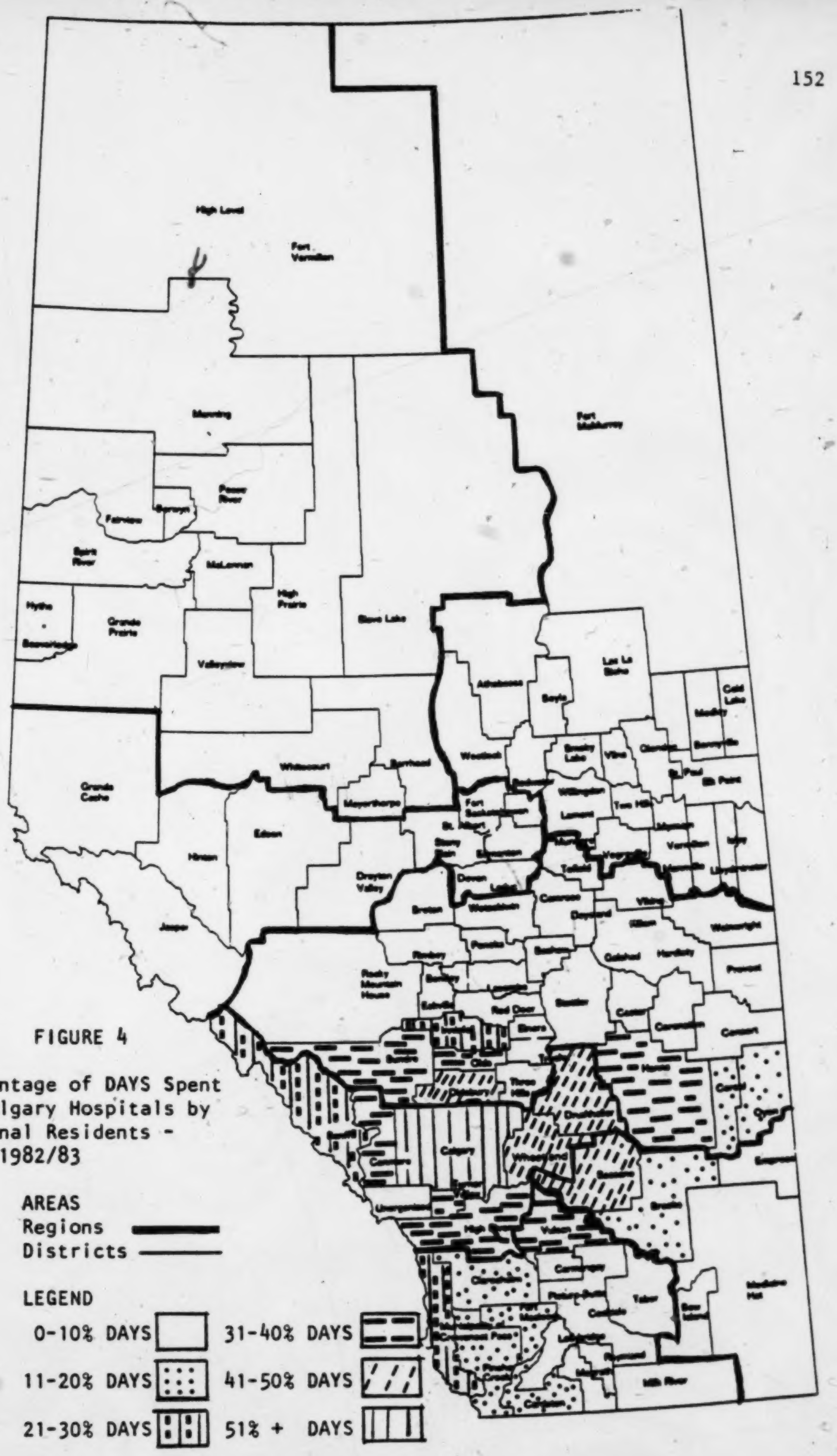

High Level
Fort Vermilion
Fort McMurray
Manning
Peace River
Fairview
Spirit River
McLennan
High Prairie
Slave Lake
Hythe
Beaverlodge
Grande Prairie
Valleyview
Athabasca
Lac La Biche
Boyle
Cold Lake
Bonnyville
St. Paul
Elk Point
Westlock
Whitecourt
Barrhead
Mayerthorpe
Grande Cache
Fort Saskatchewan
St. Albert
Stony Plain
Edson
Hinton
Jasper
Drayton Valley
Devon
Leduc
Breton
Wetaskiwin
Camrose
Tofield
Lamont
Two Hills
Vermilion
Lloydminster
Vegreville
Viking
Wainwright
Daysland
Killam
Hardisty
Galahad
Provost
Ponoka
Rimbey
Bashaw
Rocky Mountain House
Lacombe
Red Deer
Stettler
Castor
Coronation
Consort
Olds
Didsbury
Three Hills
Hanna
Oyen
Drumheller
Banff
Canmore
Calgary
Wheatland
Bassano
Brooks
Empress
High River
Vulcan
Claresholm
Fort Macleod
Pincher Creek
Cardston
Lethbridge
Raymond
Magrath
Taber
Bow Island
Medicine Hat
Milk River
AREAS
Regions
Districts
LEGEND
0-10% DAYS
11-20% DAYS
21-30% DAYS
31-40% DAYS
41-50% DAYS
51% + DAYS

FIGURE 4

Percentage of DAYS Spent in Calgary Hospitals by Regional Residents - 1971-1982/83 require care in specialized facilities (Joseph & Boeckh, 1981; Mellsop, 1969; Sohler & Thompson, 1970).

In the Ft. McMurray REG, for example, residents of the Cold Lake district on the Saskatchewan border received between 31% and 40% of their psychiatric care in Edmonton hospitals compared to residents of the Willingdon-Lamont-Mundare district located on the regional border who received between 11% and 20% or their psychiatric care in Edmonton hospitals. In the Red Deer REG, residents of the Wainwright, Provost, Consort and Coronation districts, also located on or near the Saskatchewan border, received between 21% and 30% of their psychiatric care in Edmonton hospitals. In comparison, residents of neighboring districts (e.g. Viking and Castor), who were geographically closer to Edmonton hospitals, received between 11% and 20% of their psychiatric care in Edmonton hospitals. Similarly, in the Grande Prairie REG, residents in the northern-most district of Ft. Vermilion-High Level spent between 21% and 30% of their DAYS in Edmonton hospitals compared to residents in the western-most districts who spent between 11% to 20% of their DAYS in Edmonton hospitals. Overall, however, residents of each REG whose districts bordered on or were near the Edmonton REG tended to utilize more hospital resources in the Edmonton GHD than did regional residents residing in districts at greater distances.

From Figure 4, it can be seen that district residents of the Calgary REG and the southern REGs tended to utilize

Calgary hospitals rather than Edmonton hospitals. The presence of a distance decay effect, however, appeared to be more consistent for regional residents receiving psychiatric care from Calgary hospitals than for those patients utilizing Edmonton hospitals. This may be explained by the fact that both Lethbridge and Medicine Hat district hospitals contained PSY beds throughout the study period. Therefore, district residents in these REGs would have less need to travel to Calgary hospitals to receive care in PSY beds. Figure 5A shows that the percentage of DAYS residents of the Lethbridge REG spent in the Lethbridge hospital(s) was higher than the percentage of DAYS they spent in Calgary district hospitals. Somewhat similar patterns of utilization were observed for residents of the Medicine Hat REG (Figure 5B). Residents of the Empress and Bow Island districts consumed more psychiatric hospital resources in the Medicine Hat district hospital than in Calgary hospitals with PSY beds. However, residents of Bassano spent between 41% to 50% of their DAYS in Calgary hospitals compared to less than 10% in the Medicine Hat hospital. Similarly, residents of Brooks spent between 11% and 20% of their DAYS in Calgary hospitals versus less than 10% in their own regional hospital with PSY beds.

The ALOS regional residents spent within their own area's hospitals was also compared with their ALOS in hospitals located outside their region. What is most

FIGURE 5A
Percentage of Psychiatric DAYS Spent in Lethbridge Hospitals
By Regional Residents
(1971-1982/83)

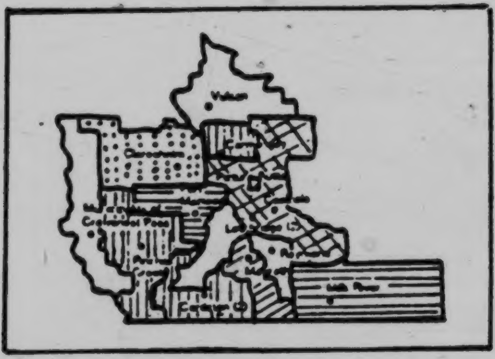
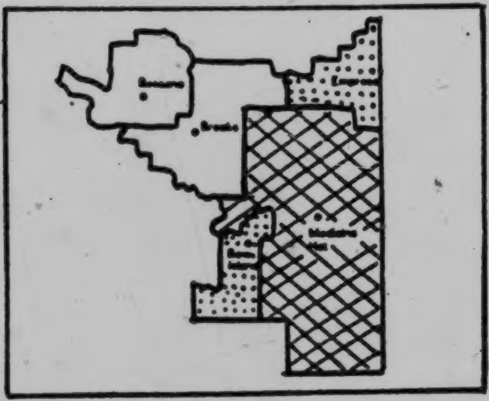

Vulcan
Crowsnest Pass
Milk River

FIGURE 5B
Percentage of Psychiatric DAYS Spent in Medicine Hat Hospital
By Regional Residents
(1971-1982/83)


Brooks
Medicine Hat

LEGEND
0-10% DAYS ☐
11-20% DAYS ░
21-30% DAYS ▥
31-40% DAYS ▤
41-50% DAYS ▨
51% + DAYS ▩

apparent from the results reported in Table 20, is that: 1) residents of each REG experienced the longest ALOS in Edmonton and Calgary REG hospitals, and 2) residents of the Edmonton (16.7 days) and Calgary (17.1 days) REGs experienced the longest ALOS of all REGs followed by residents in the southern REGs (Medicine Hat ALOS of 10.9 days; Lethbridge ALOS of 10.2 days), the northern REGs (Ft. McMurray ALOS of 8.0 days; Grand Prairie ALOS of 5.5 days), and the central Red Deer REG (ALOS of 3.9 days).

From these data it would appear that the presence of dedicated PSY beds within a REG was not the only factor influencing ALOS. The results of the previous analyses indicated that the large majority of psychiatric DAYS for patients with more serious disorders, such as the psychoses, were spent in PSY beds. However, it was also found that patients receiving care in Edmonton and Calgary REG hospitals with PSY beds experienced a longer ALOS than patients receiving care in PSY beds located in other regions. These findings would suggest that perhaps either a more intensive level of care was offered in Edmonton and Calgary psychiatric units than in other psychiatric units in the province, or that the most severely ill patients in each diagnostic category were treated within (or selectively referred to) Edmonton and Calgary hospitals. It is also possible that because Edmonton and Calgary both have large teaching hospitals that a broader range of mental disorders of varying degrees of severity may be treated. Further, the educational and/or research endeavours of these facilities may lengthen the ALOS for psychiatric patients.

4.4.2 Summary of Findings

The results of the psychiatric patient origin-destination analyses from the CB perspective yielded the following major findings:

1) Most patients who required psychiatric hospital care tended to remain within their own district of origin, irrespective of the severity of their illness or the type of care available (districts with PSY beds or districts with MED beds only). Accordingly, most psychiatric patients remained within their own mental health care REG to receive hospital care.

2) With the exception of OTHER disorders, there was a decreasing tendency for residents of MED bed GHDs to leave their home district to receive care in districts/hospitals with dedicated PSY beds as the severity of their illness decreased.

3) Residents of MED bed GHDs tended to experience longer hospital stays (ALOS) in districts/hospitals with PSY beds than did residents of PSY bed GHDs treated within their home district, irrespective of diagnosis.

4) Residents of the Ft. McMurray REG consumed the greatest proportion of psychiatric hospital resources (SEPS and DAYS) outside their own REG compared to other REG residents. Further, residents of the Ft. McMurray, Grande Prairie and Red Deer REGs tended to utilize

hospital facilities in the Edmonton REG; residents of the Lethbridge and Medicine Hat REGs tended to utilize hospital facilities in the Calgary REG.

5) In general, residents of each REG whose district bordered on the Edmonton REG tended to utilize more hospital resources in the Edmonton GHD than did regional residents residing in districts at greater distances. There were, however, exceptions within each REG. Somewhat similar patterns were observed for regional residents utilizing Calgary district hospitals. That is, residents of the Medicine Hat and Lethbridge REGs whose districts bordered on the Calgary REG utilized more resources in the Calgary district hospitals than in the Medicine Hat or Lethbridge district hospitals. Overall, however, district residents of the Medicine Hat and Lethbridge REGs tended to utilize more resources in the Lethbridge and Medicine Hat district hospitals than in the Calgary district hospitals.

6) Residents of each REG experienced the longest ALOS in Edmonton and Calgary district hospitals and residents of the Edmonton and Calgary REGs experienced the longest ALOS of all regional residents.

4.4.3 Provider-Based Perspective - Commitment Indices

The provider-based origin-destination analyses examined the proportion of hospital resources (SEPS and/or DAYS): 1) hospitals with dedicated PSY beds committed to their own district residents or to residents of MED bed

GHDs, or hospitals with MED beds only committed to their own district residents or to residents of PSY bed GHDs; 2) hospitals within each mental health care REG committed to their own or other regional residents; and 3) individual hospitals in Edmonton and Calgary GHDs with dedicated PSY beds committed to their own district residents, to residents of other GHDs with dedicated PSY beds, or to residents of MED bed GHDs, those districts which did not have any dedicated PSY beds.

Bed Type

As would be expected from the results of the CB analyses, Table 21 indicates that for the entire 12 year period, hospitals with PSY beds and hospitals with MED beds tended to commit the major portion of their resources to residents of their own districts (PSY bed hospitals: 83.4% DAYS and 84.8% SEPS; MED bed hospitals: 89.4% DAYS and 91.0% SEPS). It can also be seen from Table 21, that over time the CIs of PSY bed hospitals to their district residents declined slightly from 84.7% in 1971 to 83.9% in 1982/83. That is, the proportion of PSY bed hospital resources committed to residents of PSY bed GHDs decreased in terms of DAYS, while the proportion of PSY bed hospital resources committed to MED bed district residents increased from 15.3% in 1971 to 16.1% in 1982/83. An examination of the CIs by diagnostic category showed that of all the DAYS and SEPS accumulated by PSY bed hospitals for either ALC/DRUG disorders, neurotic disorders or psychotic

Table 21

CIs by Bed Type and Diagnosis for Selected Years[1]

Hospital Destination	Diagnostic Category	District of Origin					
		1971		1982/83		1971-82/83	
		GHDS with PSY Beds	GHDS with MED Beds	GHDS with PSY Beds	GHDS with MED Beds	GHDS with PSY Beds	GHDS with MED Beds
% DAYS Hos. with PSY Beds	Total	84.7	15.3	83.9	16.1	83.4	16.6
	Psychoses	84.5	15.5	84.0	16.0	83.2	16.8
	Neuroses	84.6	15.4	82.0	18.0	82.3	7.3
	Alc/Drug	93.7	6.3	87.6	12.4	90.0	12.0
	Other	78.6	21.4	85.0	15.0	81.9	18.1
% DAYS Hos. with MED Beds	Total	7.5	92.5	5.8	94.2	10.6	89.4
	Psychoses	8.2	91.8	4.5	95.5	11.7	88.3
	Neuroses	5.5	94.5	7.3	92.7	17.7	92.7
	Alc/Drug	11.0	89.0	8.4	91.6	12.0	88.0
	Other	9.8	22.1	4.5	95.5	15.2	84.8
% SEPS Hos. with PSY Beds	Total	86.8	13.2	84.7	15.3	84.8	15.2
	Psychoses	86.0	14.0	84.0	16.0	75.5	24.5
	Neuroses	86.9	13.1	83.4	16.6	84.4	15.6
	Alc/Drug	92.3	7.7	88.5	11.5	90.1	9.9
	Other	82.6	17.4	85.6	14.4	83.0	17.0
% SEPS Hos. with MED Beds	Total	7.6	92.4	8.1	91.9	9.0	91.0
	Psychoses	7.3	92.7	7.9	92.1	8.7	91.3
	Neuroses	6.2	93.8	6.9	93.1	7.3	92.7
	Alc/Drug	10.8	89.2	9.5	90.5	11.9	88.1
	Other	10.5	89.5	9.8	90.2	10.8	89.2

[1] Figures reported for persons 15 years of age and older.

disorders, there were increases in the proportion of DAYS and SEPS committed to MED bed district residents over time. In comparison, of all the DAYS and SEPS accumulated by PSY bed hospitals for OTHER disorders, there was a decline in the CIs to MED bed district residents. However, MED bed hospitals appeared to compensate for this decrease by committing a larger proportion of their DAYS and SEPS for OTHER disorders to their own district residents in 1982/83.

With respect to the CIs for MED bed hospitals, over the 12 year period, only 15% (DAYS) and 9% (SEPS) of their resources were committed to residents of PSY bed districts. It is assumed that residents of PSY bed districts became ill while away from home, were admitted to the local district hospital, and then possibly transferred to PSY bed hospitals if required. It is unlikely, in this investigator's opinion, that PSY bed district residents would selectively be referred to MED bed hospitals for psychiatric treatment.

Mental Health Care Regions

As expected, the results of the regional CI analyses revealed that hospitals in each REG tended to commit the greatest proportion of psychiatric resources, in terms of DAYS and SEPS, to their own regional residents. As shown in Table 22, however, Edmonton (85.4%) and Calgary (92.0%) regional hospitals tended to commit the fewest resources to their own regional residents in terms of DAYS than did

Table 22

Regional CIs: 1971 - 1982/83[1]

Utilization Measure	REG/Hospital of Destination	Edm.	Calg.	Gr. Pr.	Ft. Mc.	Red Deer	Med. Ht.	Leth.
% DAYS	Edmonton	85.4	0.4	3.2	5.7	4.7	0.2	0.4
	Calgary	0.6	92.0	0.1	0.1	3.3	1.4	2.5
	Grande Prairie	2.6	0.2	96.2	0.6	0.3	0.1	0.0
	Ft. McMurray	3.1	0.1	0.4	95.2	1.1	0.0	0.0
	Red Deer	1.5	1.1	0.1	0.2	96.7	0.2	0.1
	Medicine Hat	0.2	1.6	0.0	0.0	0.5	97.2	0.4
	Lethbridge	0.3	1.7	0.0	0.0	0.2	1.7	96.1
% SEPS	Edmonton	95.1	0.5	2.9	5.1	4.2	0.1	0.2
	Calgary	0.6	92.7	0.1	0.1	2.7	1.3	2.5
	Grande Prairie	3.4	0.4	94.9	0.7	0.5	0.1	0.0
	Ft. McMurray	3.8	0.3	0.5	94.2	1.1	0.1	0.0
	Red Deer	2.2	1.6	0.2	0.3	95.4	0.3	0.1
	Medicine Hat	0.5	2.7	0.0	0.1	0.5	95.5	0.6
	Lethbridge	0.4	2.1	0.1	0.1	0.3	1.3	95.7

[1] Figures reported for all 12 years combined, for persons 15 years of age and older.

hospitals in the remaining REGs. The CIs for DAYS among the remaining hospitals in each REG to their own residents did not vary substantially, and ranged from a low of 95.2% for the Ft. McMurray REG to a high of 97.2% for the Medicine Hat REG. Table 22 also indicates that Edmonton REG hospitals tended to commit the greatest proportion of their psychiatric resources (DAYS) to residents of the Fort McMurray REG (5.7%). Interestingly, fewer resources were committed to Grande Prairie regional residents (3.2%) than to Red Deer regional residents (4.7%). As expected the fewest psychiatric DAYS were committed to residents of the Calgary, Lethbridge and Medicine Hat REGs. Again, this finding may be associated with the presence of dedicated PSY beds in those REGs during each year of the study period, as well as the distance from Edmonton hospitals for residents of the southern REGs. In comparison to Edmonton REG hospitals, Calgary REG hospitals tended to commit the greatest proportion of psychiatric DAYS to Red Deer REG residents (3.4%), followed by residents of the southern REGs, Lethbridge (2.5%) and Medicine Hat (1.4%).

The CIs for the proportion of SEPS hospitals in each REG committed to their own residents also did not vary substantially, and ranged from a low of 92.7% for Calgary REG hospitals to a high of 95.7% for Lethbridge REG hospitals. The most noticeable change in the utilization pattern was for Edmonton REG hospitals. Whereas Edmonton hospitals committed the fewest psychiatric DAYs to their own regional residents, they ranked fourth on the CIs for SEPS (95.1%). Calgary REG hospitals, however, had the lowest CIs for SEPs to their own REG residents (92.7%) and, therefore, showed the highest commitment index (7.3%) to non-regional residents.

Edmonton and Calgary PSY Bed Hospitals

The results of the preceding origin-destination analyses seemed to indicate that hospitals with dedicated PSY beds, particularly, Edmonton and Calgary hospitals, had an important influence on REG origin-destination utilization patterns and the resulting RIs and CIs. The CIs for individual Edmonton and Calgary hospitals with dedicated PSY beds were, therefore, examined with respect to their own district residents, to residents in other districts with PSY beds, and to residents in districts with MED beds only.

An examination of the CIs presented in Table 23 would appear to indicate that the University of Alberta Hospital (UAH) was the major referral centre in Edmonton for persons residing outside the Edmonton GHD who require care in dedicated PSY beds. Over the 12 years, only 67.5% of all psychiatric DAYS at the UAH were committed to Edmonton district residents in comparison to 82.6% at the Royal Alexandra Hospital (ALEX), 79.4% at the Edmonton General Hospital (GEN), and 76.8% at the Misericordia Hospital (MIS). Not only were the CIs for MED bed district

Table 23

CIs for DAYS: Edmonton Hospitals with PSY Beds 1971 - 1982/83[1]

Utilization Measure	Diagnostic Category	Hospital Destination	Edmonton GHD	Calgary GHD	GHDS with PSY Beds	GHDS with MED Beds
% DAYS	All Diagnoses Combined	University of Alberta	67.5	0.5	3.4	28.6
		Misericordia	76.8	0.3	1.2	21.6
		Royal Alexandra	82.6	0.3	1.6	15.5
		Edmonton General	79.4	0.2	1.0	19.4
% DAYS	Psychoses	University of Alberta	70.7	0.5	2.8	26.0
		Misericordia	75.3	0.5	1.1	23.1
		Royal Alexandra	83.3	0.1	1.1	15.5
		Edmonton General	78.2	0.3	1.0	20.5
% DAYS	Neuroses	University of Alberta	62.4	0.2	3.9	33.5
		Misericordia	76.2	0.1	1.4	22.3
		Royal Alexandra	80.9	0.3	1.5	17.3
		Edmonton General	79.3	0.1	1.3	19.3
% DAYS	Alc/Drug[2]	University of Alberta	79.3	1.3	1.5	17.9
		Misericordia	84.1	0.3	1.2	14.4
		Royal Alexandra	85.5	0.9	1.5	12.1
		Edmonton General	88.9	0.5	0.7	9.9
% DAYS	Other[3]	University of Alberta	61.3	0.7	5.5	32.4
		Misericordia	79.0	0.2	1.2	19.5
		Royal Alexandra	79.8	0.0	5.3	15.0
		Edmonton General	78.7	0.3	0.8	20.1

[1] Figures reported for all 12 years combined, for persons 15 years of age and older.

[2] Alcohol and drug disorders.

[3] All other non-psychotic mental disorders.

residents highest for the UAH (28.6%), but also the CIs for PSY bed district residents were more than twice as large for the UAH (3.9%). In total, 32.5% of the DAYS accumulated at the UAH were committed to nondistrict residents compared to 23.1% at the MIS, 20.6% at the GEN, and only 17.4% at the ALEX.

This pattern did not vary substantially when the CIs for Edmonton PSY bed hospitals to non-district residents were examined for each diagnostic category, thereby offering further support for the observation that the UAH served as the primary referral centre in Edmonton for psychiatric patients. That is, the UAH committed the greatest proportion of DAYS to MED bed district residents irrespective of diagnosis, and with the exception of ALC/DRUG disorders, the ALEX committed the smallest proportion of DAYS to MED bed district residents.

An examination of the CIs for Calgary PSY bed hospitals (Table 24) revealed quite clearly that the Foothills Hospital served as the major referral centre for non-district residents. For each diagnostic category, as well as for all psychiatric disorders combined, the Foothills Hospital committed the greatest proportion of DAYS to MED bed and PSY bed district residents followed by the Calgary General Hospital and the Holy Cross Hospital respectively. In total, the proportion of DAYS committed to non-district residents by the Foothills Hospital for all psychiatric disorders combined was 16.2%, almost twice

Table 24

CIs for DAYS: Calgary Hospitals with PSY Beds

1971 - 1982/83[1]

Utilization Measure	Diagnostic Category	Hospital Destination	Calgary GHD	Edmonton GHD	GHDS with PSY Beds	GHDS with MED Beds
% DAYS	All Diagnoses Combined	Foothills	83.4	0.4	3.1	13.1
		Calgary General	90.7	0.7	1.6	7.0
		Holy Cross	93.0	0.3	0.7	6.0
% DAYS	Psychoses	Foothills	84.3	0.4	2.3	13.0
		Calgary General	90.4	1.0	1.4	7.2
		Holy Cross	92.7	0.3	0.4	6.6
% DAYS	Neuroses	Foothills	81.0	0.3	4.4	14.3
		Calgary General	91.5	0.2	1.3	7.0
		Holy Cross	93.0	0.1	1.2	5.7
% DAYS	Alc/Drug[2]	Foothills	90.5	0.1	1.6	7.8
		Calgary General	92.4	0.5	1.5	5.6
		Holy Cross	95.6	0.0	0.7	3.7
% DAYS	Other[3]	Foothills	80.5	0.9	4.8	13.8
		Calgary General	88.5	0.1	2.9	8.5
		Holy Cross	93.4	0.6	0.4	5.5

[1] Figures reported for all years combined, for persons 15 years of age and older.

[2] Alcohol and drug disorders.

[3] All other non-psychotic mental disorders.

the psychiatric resources committed by the Calgary General (8.6%), and more than twice the resources committed by the Holy Cross (6.7%).

In overview, the results of the CI analyses for Edmonton and Calgary PSY bed hospitals indicate that both major teaching facilities (the UAH in Edmonton and the Foothills in Calgary) served as referral facilities for the treatment of psychiatric patients, irrespective of patient diagnosis. However, the UAH appears to be the province's primary referral centre as the proportion of DAYS committed to non-district residents (32.5%) was approximately twice that of the Foothills Hospital (16.6%).

4.4.4 Summary of Findings

The results of the psychiatric patient origin-destination analyses from the PB perspective yielded the following major findings:

1) Hospitals with PSY beds and hospitals with MED beds tended to commit the major portion of their resources (DAYS and SEPS) to residents of their own districts; however, the proportion of resources committed to residents of MED bed GHDs by PSY bed hospitals tended to increase over time.

2) Similarly, hospitals in each REG committed the greatest proportion of their psychiatric resources to their own REG residents; however, Edmonton and Calgary REG hospitals tended to commit the smallest proportion of resources

(DAYS) to their own REG residents.

3) Of the Edmonton and Calgary district hospitals with dedicated PSY beds, the two major teaching hospitals (University of Alberta Hospital in Edmonton, and the Foothills Hospital in Calgary) committed the greatest proportion of psychiatric DAYS to non-district residents (i.e. to residents of MED bed GHDs and other PSY bed GHDs). However, of these two facilities, the UAH with 32.5% of its psychiatric DAYS committed to non-district residents appeared to be the province's primary acute care referral hospital for the treatment of the mentally ill.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Chapter five presents: 1) an overview of the study and the investigational strategy, 2) a summary of the major research findings, 3) conclusions arising from the results of this investigation, and 4) recommendations regarding future research and planning strategies.

5.1 Overview of the Study

Since the early 1960s, medical advances made in the treatment of the mentally ill, and changes in Canada's federal-provincial hospital funding policies has resulted in the deinstitutionalization of psychiatric patients from mental hospitals. At the same time, there has been an increased use of community-based general hospitals and outpatient services for the treatment of the mentally ill.

In Alberta, recognition of the changing care requirements of the mentally ill, and the need to provide high quality health care in a cost-efficient manner, has resulted in the establishment of regional mental health planning committees. These committees, in cooperation with government policy makers, are investigating approaches to developing a comprehensive and coordinated regionalized mental health care system. It has also been recognized, however, that previous mental health planning efforts in many jurisdictions have been characterized by a lack of information to assist decision-makers in determining whether existing services are being utilized efficiently and effectively. As a prerequisite to rational planning, such information needs have been identified as: population-based measures of service utilization and trends over time, as well as service-specific and diagnosis-specific geographic patterns of utilization. The present study of province-wide general hospital utilization patterns and trends by the mentally ill in Alberta was, therefore, undertaken to supplement these planning information needs.

A selective review of the literature was undertaken in order to develop a theoretical and methodological framework for studying patterns and trends in acute care hospital utilization by the mentally ill. Based on existing hospital utilization and mental health care planning models found in the literature, a conceptual model of utilization was formulated for this investigation. Following from this model, environmental and individual determinants which could potentially influence psychiatric hospital utilization patterns in Alberta were examined. Other factors identified in the literature as being of particular relevance to this investigation were also examined: 1) the utilization of medical-surgical beds for treating psychiatric patients, 2) psychiatric readmission patterns in acute care hospitals, and 3) the utilization of alternative mental health care services (e.g. outpatient services). In addition, previous Alberta-based planning studies on psychiatric service needs were reviewed to assist in refining the study objectives and to identify gaps in the current mental health planning information base. Finally, patient origin-destination studies were reviewed with respect to factors which could influence regional hospital utilization patterns and the appropriate methods for measuring patient flow patterns.

The overall research strategy focused on providing a description of hospital utilization patterns and trends for psychiatric care in Alberta over time. Using retrospective, longitudinal data, provincial and regional hospital utilization patterns and per capita utilization rates were identified and described. These data were also used to describe and evaluate psychiatric patient origin-destination utilization patterns by bed type (districts/hospitals with PSY beds versus districts/hospitals with MED beds only) and diagnosis, and by the recently established mental health care regions.

The data analyses were divided into three major parts which corresponded to the overall study objectives. The first set of analyses examined provincial trends in psychiatric hospital utilization patterns and per capita utilization rates by bed type, diagnosis, and sex. The second set of analyses examined the relative consumption of general hospital resources by residents residing within each of the province's seven mental health care regions. Finally, the third set of analyses examined psychiatric patient origin-destination patterns from a community-based and provider-based perspective in terms of bed type, diagnosis, and the district and region of residence. Each set of analyses was undertaken to identify and describe environmental and individual determinants of hospital utilization by the mentally ill in Alberta which could be of importance to future planning considerations.

5.2 Major Findings

Summarized below are the major findings of this investigation of hospital utilization by the mentally ill in Alberta.

1) Psychiatric separation rates (SEPRATES), for persons 15 years of age and older, from Alberta's acute care hospitals increased by 15% from 1971 to 1974 and then steadily declined during the remainder of the study period. The overall decrease in SEPRATES from 1971 to 1982/83 was approximately 22 percent. Psychiatric patient day rates (DAYRATES) fluctuated from year to year but also showed an overall decline of -7.5% from 1971 to 1982/83. As SEPRATES dropped at a higher rate than DAYRATES, the average length of stay (ALOS) per patient separation increased from 13.2 days per patient separation in 1971 to 14.6 days in 1982/83.

2) Comparisons of provincial utilization rates in

hospitals with dedicated psychiatric (PSY) beds and hospitals with medical (MED) beds only indicated the following:

a) From 1971 to 1982/83, SEPRATES and DAYRATES from hospitals with PSY beds declined by -16.6% and -12.9% respectively. Although SEPRATES from hospitals with MED beds decreased by -16.0% during this time period, DAYRATES showed a 12 year increase of +8.9 percent.

b) DAYRATES and SEPRATES for persons with diagnoses of psychoses were consistently higher in hospitals with PSY beds. However, provincial utilization rates for the psychoses showed an overall increase from 1971 to 1982/83 in both hospitals with PSY beds and hospitals with MED beds only.

c) SEPRATES for persons with diagnoses of neurosis were higher in hospitals with MED beds than in hospitals with PSY beds, but DAYRATES in hospitals with PSY beds tended to be almost twice as high as DAYRATES in hospitals with only MED beds. From 1971 to 1982/83, however, hospital utilization rates (SEPRATES and DAYRATES) for the neuroses declined by approximately -50% in PSY bed hospitals and by approximately -40% in MED bed hospitals.

d) Over the 12 year study period, SEPRATES and DAYRATES for persons with alcohol and drug disorders (ALC/DRUG) treated in hospitals with MED beds tended to increase, whereas SEPRATES and DAYRATES in hospitals with PSY beds showed an overall decline. Consequently, by 1982/83, 61% of the SEPS and 50% of the DAYS for ALC/DRUG disorders were accounted for by hospitals with MED beds as opposed to hospitals with PSY beds.

e) During each year of the study period, the ALOS in hospitals with PSY beds (16 to 18 days) tended to be twice as high as the ALOS in hospitals with MED beds (7 to 9 days). Further, the ALOS in hospitals with PSY beds tended to exceed the ALOS in hospitals with MED beds irrespective of diagnosis.

3) Of the province's seven mental health care regions (REGs), residents (15 years of age and older) of the Edmonton and Calgary REGs tended to consume the fewest hospital resources (SEPRATES and DAYRATES) for psychiatric disorders on an age-sex adjusted per capita basis; however, they experienced the longest hospital stays (ALOS) of all regional residents. In comparison, residents of the northern REGs, Ft. McMurray and Grande Prairie, tended to experience the highest SEPRATES; the highest DAYRATES also tended to be experienced by Ft. McMurray regional residents.

4) Over the 12 year study period, Edmonton and Calgary regional residents were respectively -23.9% and -22.4% below the provincial SEPRATE (90.3 separations per 10,000 person-years) and -5.7% and -0.7% below the provincial DAYRATE (1187.1 patient days per 10,000 person-years). Residents of the remaining REGs were above the provincial utilization rates, however, Ft. McMurray regional residents were highest at +70.3% (SEPRATE of 153.8) above the provincial SEPRATE and +20.4% (DAYRATE of 1429.1) above the provincial DAYRATE.

5. Most persons who required psychiatric hospital care in Alberta during the 1971 to 1982/83 study period tended to remain in their hospital district of residence, and mental health care REG, irrespective of the severity of their illness or the type of care available in their district hospital(s) (i.e. PSY beds or MED beds only). However, with the exception of OTHER disorders, there was an increasing tendency for residents of districts with only MED beds to leave their home district to receive care in districts/hospitals with dedicated PSY beds as the severity of their illness increased. Furthermore, these patients also tended to experience a longer ALOS in districts/hospitals with PSY beds than did patients residing in and treated within those districts, irrespective of diagnosis.

6. Residents who were required to leave their REG tended to utilize hospitals with PSY beds in the Edmonton

district (residents of the Ft. McMurray, Red Deer, and Grande Prairie REGs) or in the Calgary district (residents of the Lethbridge and Medicine Hat REGs). Findings of the regional origin-destination analysis for district residents utilizing Edmonton and Calgary district hospitals with PSY beds indicated the following:

a) Residents of the Ft. McMurray, Red Deer and Grande Prairie REGs, in descending order, tended to consume more psychiatric hospital resources (DAYS and SEPS) outside their own REG than did residents of the Lethbridge and Medicine Hat REGs.

b) Residents of 12 of the 20 districts in the Ft. McMurray REG consumed between 21% and 50% of their psychiatric hospital resources (DAYS) in Edmonton district hospitals with PSY beds. Residents of nine districts in the Red Deer REG and six districts in the Grande Prairie REG consumed between 21% and 40% of their psychiatric DAYS in Edmonton hospitals.

c) In general, residents of the Ft. McMurray, Red Deer and Grande Prairie REGs whose districts were on or near the Edmonton REG border tended to utilize more hospital resources in the Edmonton district than did regional residents residing at greater distances.

d) District residents of the Lethbridge and Medicine

Hat REGs tended to consume more psychiatric resources (DAYS) in their own district hospitals with PSY beds than in Calgary hospitals with PSY beds. Residents of the Bassano hospital district in the Medicine Hat REG, however, whose district bordered on the Calgary REG, spent between 41% and 50% of their psychiatric DAYS in Calgary district hospitals with PSY beds.

7. Both hospitals with PSY beds and hospitals with MED beds only tended to commit the large majority of their resources (DAYS and SEPS) to residents of their own districts. The proportion of resources committed by hospitals with PSY beds to residents of districts with MED beds only, however, tended to increase from 1971 to 1982/83 for the psychoses, neuroses, and ALC/DRUG disorders but declined for OTHER disorders from 21.4% in 1971 to 15.0% in 1982/83.

8. Of the Edmonton hospitals with dedicated PSY beds, the University of Alberta Hospital (UAH) committed 32.5% of its psychiatric resources (DAYS) to non-district residents, 28.6% of which were committed to residents of districts with MED beds only. This commitment index (CI) was higher than the CIs to non-district residents for the Misericordia Hospital (23.1%), the Edmonton General Hospital (20.6%) and the Royal Alexandra Hospital (17.4%).

9. Of the Calgary hospitals with dedicated PSY beds, the Foothills Provincial General Hospital committed 16.6% of its psychiatric resources (DAYS) to non-district

residents, 13.1% of which were committed to residents of districts with MED beds only. In comparison, the CIs to non-district residents for the Calgary General Hospital and the Holy Cross Hospital were respectively 7.0% and 6.0 percent.

5.3 Conclusions

Presented below are the conclusions of this investigation related to psychiatric hospital utilization patterns and trends, and patient origin-destination patterns which occurred during the 1971 to 1982/83 study period.

1) The initial increase in psychiatric SEPRATES from Alberta's acute care hospitals during the early 1970s may have been influenced by the publication of the Blair Report in Alberta, as well as the deinstitutionalization movement and the greater emphasis placed on the utilization of general hospitals for treating the mentally ill. The subsequent decline in hospital utilization rates (SEPRATES and DAYRATES), however, may have been associated with the greater use of alternative mental health care services. From 1976 to 1980/81, for example, the number of visits to hospital based outpatient programs in Alberta increased by 71 percent.

2) The emphasis on community-based care and the deinstitutionalization of patients from mental hospitals may have been associated with the 12 year (1971-1982/83) increase in acute care hospital utilization rates in Alberta for

persons with psychotic disorders. This change in the utilization pattern may have also influenced the decline in utilization rates for ALC/DRUG disorders in hospitals with PSY beds and the concomitant increase in utilization rates in hospitals with MED beds only. The overall decrease in hospital utilization rates for persons with diagnoses of neurosis, however, again suggests an increased use of alternative mental health care services to treat this patient group.

3) The psychiatric service role of Alberta's hospitals with MED beds only appears to be increasing in importance as evidenced by the rise in utilization rates for persons with psychoses, ALC/DRUG disorders and OTHER (non-psychotic) disorders. In comparison to hospitals with dedicated PSY beds, however, the results of the analyses appear to indicate that the primary psychiatric service role of MED bed hospitals is to treat patients with relatively less serious mental disorders, and/or to stabilize and then refer those who are more seriously ill to hospitals with psychiatric units.

4) As indicated in the literature review, a major determinant of inpatient hospitalization is the number and variety of outpatient and alternative mental health care services available to a patient. That is, the greater the availability of alternative services, the fewer inpatient hospital resources are consumed. The lesser availability of alternative mental health care services outside the Edmonton and Calgary REGs may, therefore, have been

influential in the higher per capita utilization rates experienced by other regional residents. However, the longer hospital stays experienced by Edmonton and Calgary regional residents were likely associated with the referral of persons with more serious illnesses (i.e. selective referrals or admissions) due to the high demand placed on Edmonton and Calgary district hospitals.

5) The results indicate that the psychiatric service roles of hospitals with MED beds only appear to be increasing in importance. However a major determinant of patient's care seeking patterns beyond their district of residence was the lack of dedicated PSY beds in their district hospital(s), (and probably the lack of alternative services), particularly for patient with more serious mental disorders. Consequently, the current considerations to regionalize mental health care services (both inpatient and outpatient services) in Alberta would be strongly supported by these findings.

6. Further to the above, however, several findings based on the relevance and commitment indicies suggest that the current mental health care REG boundaries may require some adjustments for planning purposes.

a) First Edmonton district hospitals with PSY beds are serving as the primary referral centres for residents of the Ft. McMurray, Grande Prairie, and Red Deer REGs who are required to leave their REG for psychiatric hospital care. This is particularly true for residents of the southern portion of the Ft. McMurray REG, as well as residents in the Red Deer and Grande Prairie REGs whose districts bordered on or were near the Edmonton REG.

b) Second, although the Ft. McMurray and Red Deer REGs contained hospitals with PSY beds after 1980/81, regional residents were still bypassing these hospitals and were instead referred to Edmonton district hospitals. Consequently, it would appear that these hospitals are not functioning as referral centres for their regional residents.

c) Third, Red Deer regional residents whose districts bordered on or were near the Calgary REG also bypassed their own regional hospitals with PSY beds and utilized Calgary district hospitals.

d) Finally, it would appear that the Medicine Hat and Lethbridge district hospitals, which contained dedicated PSY beds through the course of the study period, are not functioning as regional referral centres for residents of the Vulcan GHD (Lethbridge REG), Bassano and Brooks GHDs (Medicine Hat REG), as those regional residents tended to utilize Calgary district hospitals.

5.4 Recommendations

The following are the major recommendations based on the findings and conclusions of this investigation. The recommendations also take into consideration certain issues and planning strategies discussed in Chapter II.

1) According to the Clarke Report, it was recommended that each mental health care REG in Alberta should provide primary care (outpatient clinics), secondary care (general hospital psychiatric units), and tertiary care (specialized psychiatric hospitals) to regional residents. Given the dependence of the northern REGs on Edmonton district hospitals with PSY beds, the dependence of the Red Deer REG on both Edmonton and Calgary hospitals, and the dependence of the Vulcan and Bassano districts on Calgary hospitals, it is recommended that consideration be given to adjusting the present mental health care regional boundaries to better conform to actual hospital utilization/referral patterns.

2) Any adjustments of the mental health care regional boundaries should also take into consideration the acutal and planned addition of acute care PSY beds in each REG during 1985 to 1988, and the likely designation of psychiatric units to admit and treat involuntary patients.

3) Further to the above, future research efforts should focus on the evaluation of diagnosis-specific patient origin-destination patterns with respect to the appropriateness of the regional boundaries, particularly during the next three to four years, to determine: 1) if

changes in the supply and distribution of PSY beds as well as any policy changes have significantly altered regional patterns of hospital utilization by the mentally ill, 2) whether Edmonton and Calgary hospitals with psychiatric units are still functioning as the province's primary acute care referral centres for psychiatric patients, particularly for those patients with psychotic disorders, or 3) if the designation of psychiatric units, under a revised Mental Health Care Act, has strengthened the roles of hospitals with PSY beds (in REGs other than Edmonton and Calgary) as regional referral centres.

4) As acute care hospitals, mental hospitals, and outpatient services form a continuum of care for the mentally ill, and as all hospitals providing psychiatric care are under the jurisdication of Alberta Hospitals and Medical Care, it is recommended that for planning purposes, mental health care regional boundaries be made coterminous with hospital district boundaries.

5) Finally, it is strongly recommended that serious consideration be given to developing a computerized and timely provincial mental health information system for inpatient and outpatient services in order to facilitate planning efforts aimed at a coordinated, regionalized mental health care system in Alberta.

REFERENCES

Akiskal, H.S., & Webb, W.L. (1983). Affective disorders: I: Recent advances in clinical conceptualization. Hospital and Community Psychiatry, 34(8), 695-701.

Alberta Hospital Association (1982). The rural hospital in Alberta. 1982 Presidential Paper.

Allodi, F.A., & Kedward, H.B. (1973). The vanishing chronic. Canadian Journal of Public Health, 64, 279-289.

Allodi, F.A., & Kedward, H.B. (1977). The evolution of the mental hospital in Canada. Canadian Journal of Public Health, 68(May/June), 219-224.

Ames, D.A. (1978). Developing a psychiatric inpatient service in a rural area. Hospital & Community Psychiatry, 29(12), 787-791.

Anderson, J.G. (1976). A social systems model of hospital utilization. Health Services Research,11(3), 271-287.

Anderson, R., & Newman, J.F. (1973). Societal and individual determinants of medical care utilization in the United States. Millbank Memorial Fund Quarterly, 51(3), 95-124.

Arboleda-Florez, J., Pablo, R.Y., Kadiec, K.E., (1982). Patterns of psychiatric hospitalization: III: The readmission of psychotic patients in general hospitals in Alberta.Calgary General Hospital, Department of Psychiatry. Manuscript submitted for publication.

Babigan, H.M. (1977). The impact of community mental health services on utilization. Archives of General Psychiatry, 34(4), 385-394.

Bachrach, L. (1975a). Psychiatric bed needs: An analytic review. DHEW Publication No.(ADF) 75-205, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

Bachrach, L. (1975b). Marital status and mental disorders: an analytic review. DHEW Publication No. (ADM) 75-217, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

Bachrach, L. (1976). Deinstitutionalization: An analytic review and sociological perspective.National Institute of Mental Health, Rockville, Md.

Bachrach, L. (1977). Deinstitutionalization and mental health services in rural areas. Hospital & Community Psychiatry, 28(9), 669-672.

Bachrach, L. (1979). Planning mental health services for chronic patients. Hospital & Community Psychiatry, 30(6), 387-393.

Bachrach, L. (1981a). General hospital psychiatry: Overview from a sociological perspective. The American Journal of Psychiatry , 138(7), 879-887.

Bachrach, L. (1981b). The effects of deinstitutionalization on general hospital psychiatry. Hospital & Community Psychiatry, 32(11), 786-780.

Barr, A. (1957). The population served by a hospital group in England. The Lancet , 2, 1105-1108.

Bay, K.S., & Nestman, L.J. (1980). A hospital service population model and its application. International Journal of Health Services, 10(4), 677-694.

Bay, K.S., & Nestman, L.J. (1984). The use of bed distribution and service population indexes for hospital bed allocation. Health Services Research, 19(2), 141-160.

Blair, W.R.N. (1969). Mental Health in Alberta . Human Resources Research and Development, Edmonton, Alberta.

Bland, R. C. (1977). Demographic aspects of functional psychoses in Canada. Acta Psychiatria Scandinavia , 55, 369-380.

Bland, R.C., & Orn, H. (1978). Fourteen-year outcome in early schizophrenia. Acta Psychiatria Scandinavia , 58, 327-338.

Bland, R.C., & Orn, H. (1981). Schizophrenia:Sociocultural factors. Canadian Journal of Psychiatry, 26, 3, 186-188.

Bland, R.C. (1982). The Long Term Mentally Ill: An Epidemiological Perspective . University of Alberta, Department of Psychiatry. Unpublished manuscript.

Bosanac, E.M., Parkinson, R.C., & Hall, D.S. (1976). Geographic access to hospital care: a 30 minute travel time standard. Medical Care, 14, 616-624.

Brody, E.M., & Klebon, M.H. (1981). Physical and mental health symptoms of older people: Who do they tell? Journal of the American Geriatrics Society, 29(10), 442-449.

Brook, C.P.B. (1964). Psychiatric units in gernal hospitals. The Lancet, 684-686.

Butler, R.N. (1975). Psychiatry and the elderly: An overview. The American Journal of Psychiatry, 132(9), 893-900.

Cardillo, B. (1980). Psychiatric discharges from non-psychiatric wards of general hospitals. Statistics Canada. Unpublished report.

Carstairs, V. (1981). Small area analyses and heealth services research. Community Medicine, 3, 131-139.

Ciocco, A., & Altman, I. (1954). Medical service areas and distances traveled for physician care in Western Pennsylyania. Public Health Monograph, No. 19. U.S. Government Printing Office, Washington, D.C.

Clarke Institue of Psychiatry: Consulting Group (1983). Southern Alberta study of psychiatric needs and provisions . Southern Alberta Psychiatric Study Committee, Calgary General Hospital, Alberta.

Clausen, J.A. (1979). Mental disorders. In: Handbook of Medical Sociolology . Eds. H.E. Freeman, S. Levine, and L.G. Leeder. Englewood Cliffs, N.J.: Prentice Hall, pp.97-112.

Cockerham, W.C. (1982). Medical Sociology. Englewood Cliffs, N.J.: Prentice Hall, pp.239-273.

Cotton, P.G., Bene-Kociemba, A., & Cole, R. (1979). The effect of deinstitutionalization on a general hospital's inpatient psychiatric service. Hospital & Community Psychiatry, 30(9), 609-612.

Crichton, A. (1975). Mental health and social policies: an overview. Canada's Mental Health, 23(4), 2-4.

D'Arcy, C. (1977). Patterns in the delivery of psychiatric care in Saskatchewan 1971-72, Part III. Canadian Psychiatric Association Journal, 22, 215-233.

D'Arcy, C., & Fritz, W. A mental health system in transition: profiles of change. Canadian Journal of Psychiatry, 24(2), 121-129.

D'Arcy, C., & Schmitz, J.A. (1979). Sex differences in the utilization of health services for psychiatric problems in Saskatchewan. Canadian Journal of Psychiatry, 24(1), 19-27.

Dear, M. (1977). Locational factors in the demand for mental health care. Economic Geography, 53, 223-240.

Dohrenwend, B.P., & Dohrenwend, B.S. (1982). Perspectives on the past and future of psychiatric epidemiology. American Journal of Public Health, 72(11), 1271-1279.

Donabedian, A. (1973). Aspects of medical care administration. Cambridge, Mass.: Harvard University Press.

Downs, S.L. (1980). Small hospitals will have to redefine their role. Health Management Forum, Winter, 62-73.

Drewry, R.B. (1983). Report of the task force to review the Mental Health Act. Government of Alberta, Social Services and Community Health.

Drossness, D.L., & Lubin, J.W. (1966). Planning can be based on patient travel. The Modern Hospital, 106(4), 92-94.

Flamm, G.H. (1979). The expanding role of general hospital psychiatry. Hospital & Community Psychiatry, 30(3), 190-192.

Freiedman, E. (1981). Hospital psychiatric services begin a changing of the guard. Hospitals , May, 52-55.

Fruen, M.A., & Cantwell, J.R. (1982). Geographic distribution of physicians: past trends and future influences. Inquiry , 19, 44-50.

Frumkin, M. (1982). Assessing service delivery systems: A generic framework. Administration in Mental Health Services, 10(2), 79-90.

Gelber, S.M. (1966). The path to health insurance. In: C.A. Meilicke and J.L. Storch, Eds., Perspectives on Canadian Health and Social Services Policy: History and Emerging Trends, Michigan: Health Administration Press, 1980, pp. 156-165.

Glasscote, R.M., Gudeman, J.E., & Miles, D.G. (1977). Creative mental health services for the elderly. American Psychiatric Association, Washington, D.C., pp.7-17.

Goldberg, E.M., & Morrison, S.L. (1963). Schizophrenia and social class. British Journal of Psychiatry, 109, 785-802.

Gove, W.R. (1972). The relationship between sex roles, marital status and mental ilness. Social Forces, 51, 34-44.

Greenblatt, M., Becerra, R.M., & Serafentinides, E.A. (1982). Social networks and mental health: An overview. American Journal of Psychiatry, 139, 977-984.

Greenhill, M. (1979). Psychiatric units in general hospitals: 1979. Hospital & Community Psychiatry, 30(3), 169-182.

Greenley, J.R., & Mechanic, D. (1976). Social selection in seeking help for psychological problems. Journal of Health and Social Behavior, 17, 249-262.

Griffith, J.R. (1972). Quantitative techniques for hospital planning and control. Toronto: Lexington Books.

Griffith, J.R. (1978). Measuring hospital performance. Chicago: Blue Cross Association.

Griffith, J.R., Hancock, W.M., & Munson, F.C. (1976). Cost control in hospitals. Michigan: Health Administration Press.

Griffith, J.R., Restuccia, J.D., Tedeschi, P.J., Wilson, P.A., & Zuckerman, H.S. (1981). Measuring community hospital services in Michigan. Health Services Research, 16(2), 135-160.

Harris, D.M. (1975). An elaboration of the relationship between general hospital bed supply and general hospital utilization. Journal of Health and Social Behavior, 16(2), 163-172.

Health and Welfare Canada (1979). Adult psychiatric service provided by general hospitals. Ontario: Department of National Health and Welfare.

Health and Welfare Canada (1982). Suicide among the aged in Canada. Ontario:Department of National Health and Welfare.

Heaton, P. (1981). Medical and surgical care in small communities in Alberta. Unpublished report presented at Conference on Rural Health Care in Alberta.

Heseltine, G.F. (1982). Blueprint for change:The next ten years. Ontario: Ministry of Health.

Holzer, C., Jackson, D.J., Tweed, D. (1981). Horizontal synthetic estimation: A strategy for estimating small area health related characteristics. Evaluation and Program Planning, 4,29-34.

Horwitz, A. (1977). The pathways into psychiatric treatment: Some differences between men and women. Journal of Health and Social Behavior, 18, 19-178.

Huisani, B.A., Neff, J.A., & Stone, R.H. (1979). Psychiatric impairment in rural communities. Journal of Community Pychology, 7, 137-146.

Joseph, A.E. (1979). The referral system as a modifier of distance decay effects in the utilization of mental health care services. Canadian Geographer, 23, 159-169.

Joseph, A.E., & Boeckh, J.L. (1981). Locational variation in mental health care utilization dependent upon diagnosis: A Canadian example. Social Science and Medicine, 15(D), 395-404.

Keill, S.L. (1981). The general hospital as the core of the mental health service system. Hospital & Community Psychiatry, 32(11), 776-778.

Kessler, L. (1983). Modeling denominator populations for mental health care:Part II. Health Services Research, 18(2), 310-324.

Kramer, M. (1975). Some perspectives on the role of biostatistics and epidemiology in the prevention and control of mental disorders. Millbank Memorial Fund Quarterly, Summer, 279-336.

LaFave, H.G., & VandenHam, M. (1979). Mental health in Saskatchewan: A look at the past, present, and future. Canada's Mental Health, 27(1), 13-16.

Lindenfield, R. (1959). Hospital insurance in Canada: An example in federal-provincial relations. In: C.A. Meilicke and J.L. Storch, Eds.: Perspectives in Canadian Health and Social Services Policy: History and Emerging Trends. Michigan: Health Administration Press, 1980, pp. 166-182.

Lipinski, E. (1981). Canadian psychiatry of the 80's: Gateway or goal. Canadian Journal of Psychiatry, 26, 3-12.

MacStravic, R.E. (1978). Determining health needs. Michigan: Health Administration Press.

Manucci, M., & Kaufman, M.R. (1966). The psychiatric inpatient unit in a general hospital: A functional analysis. The American Journal of Psychiatry, 1329-1243.

Marrinson, R. (1964) Hospital services areas: Time replaces space. Hospitals, 38(2), 52-54.

Matras, J. (1977) Introduction to population: A sociological approach. Englewood Cliffs, N.J.: Prentice Hall, Inc.

Mausner, J.S., & Bahn, A.K. (1974). Epidemiology: An introductory text. Philadelphia, Pa.: W.B. Saunders Company.

McGuirk, M.A., & Porell, F.W. (1984). Spatial patterns of hospital utilization: The impact of distance and time. Inquiry , 21, Spring, 84-95.

McKerracher, D.G., & Smith, C.M. (1964). A survey of psychiatric units in general hospitals in Canada. Canadian Medical Association Journal, 90, 1032-1033.

McKinsey & Company (1980). The Challenge for Psychiatric Care in Edmonton and Norther Alberta: An action program for the 1980's. Edmonton Hospitals Psychiatric Study Committee, Edmonton, Alberta.

McQueen, R.J.C. (1977). Change is vital if small hospitals are to survive. Hospital Administration in Canada, Nov., 4.

Meade, J. (1974). A mathematical model for deriving hospital service areas. International Journal of Health Services, 4(2), 353-364.

Mechanic, D. (1978). Medical Sociology. New York: The Free Press.

Mellsop, G.W. (1969) The effect of distance in determining hospital admission rates. The Medical Journal of Australia, 2, 814-817.

Mezey, A.G., & Evans, E. (1970). Psychiatric admissions from North London related to demographic and ecological characteristics. British Journal of Psychiatry, 117, 187-193.

Miller, D.H. (1974). Community mental health: A study of service and clients. Lexington, Mass.: D.C. Heath and Company.

Miller, S.M., & Mishler, E.G. (1959). Social class, mental illness and American psychiatry. Millbank Memorial Fund Quarterly, 37, 174-199.

Moll, A. E. (1965). The patient. In: M.R. Kaufman (Ed.), The Psychiatric Unit in a General Hospital. New York: International University Press, Inc.

Moran, A. E. (1980). Psychiatric bed needs: Quantifying the impact of alternative services. Journal of Medical Systems, 4(1), 9-26.

Morrill, R.L., & Earickson, R. (1969). Locational efficiency of Chicago hospitals: An experimental model. Health Services Research, 128-141.

Northcott, H.C. (1980). Convergence or divergence? The rural-urban distribution of physicians and dentists in census divisions and incorporated cities, towns and villages in Alberta, Canada 1956-1976. Social Sciences and Medicine, 14(d), 17-22.

Pablo, R., Kadlec, K.E., & Lamarre, C.J. (1982). Patterns of Psychiatric Hospitalization: Part I. The Readmission of Psychotic Patients in Mental Hospitals and General Hospitals in Alberta. Submitted for publication. Calgary General Hospital, Department of Psychiatry, Calgary, Alberta.

Person, F.H. (1962). Geographic variation in first admission rates to a state mental hospital. Public Health Reports, 77, 719-730.

Prosen, H., & Toews, J. (1982). Psychiatric units under analysis. Dimensions, April, 30-33.

Prosen, H., & Toews, J. (1982). Psychiatric units under analysis, Part II. Dimensions, May, 36-38.

Raasok, S.M. (1979). Nursing home bed utilization in Alberta. Unpublished Masters thesis. Division of Health Services Administration, University of Alberta.

Rosen, B.M. (1974). A model for estimating mental health needs using 1970 census socioeconomic data. DHEW Publication No. (ADM) 74-68. U.S. Government Printing Office, Washington, D.C.

Rosen, B.M., Goldsmith, H.F., & Redick, R.W. (1979). Demographic and social indicators, uses in mental health planning in small areas. World Health Statistics Quarterly, 32, 11-101.

Richman, A., & Harris, P. (1982). General hospital psychiatry: Is their role and function adjunctive or pivotal? Submitted for publication. Departments of Psychiatry and Preventive Medicine, Dalhousie University.

Sadavoy, J. (1981). Psychogeriatric care in the general hospital. Candadian Journal of Psychiatry, 26(5), 334-336.

Schwarz, C.J., Stovel, T., & Bennett, M. (1980). Treatment of the elderly on a general hospital psychiatric short-stay unit. Canadian Journal of Psychiatry, 25(8), 633-637.

Scherl, D.J., & Macht, L.B. (1979). Deinstitutionalization in the absence of consensus. Hospital & Community Psychiatry, 30(9), 599-604.

Schulberg, H.C. (1963). Psychiatric units in general hospitals: Boon or bust? The American Journal of Psychiatry, 120, 30-36.

Selltiz, C., Wrightsman, L.S., & Cook, S.W. (1976). Research Methods in Social Relations. New York:Holt, Rinehardt and Winston.

Sharp, L.J., & McCarthy, W.T. (1971). Patient origin study. Northwest Medicine, 70(2), 838-841.

Shaughnessy, P.W. (1982). Methodological issue in per capita measurement in health care. Health Services Research, 17(1), 61-81.

Shonick, W. (1976). Elements of planning for area-wide personal health services. St. Louis, Mo.: The C.V. Mosby Company.

Smith, C.J. (1976). Distance and the location of mental health facilities: a divergent viewpoint. Economic Geography, 52, 181-191.

Smith, C.M. (1979). From hospital to community: A system changes. Canadian Journal of Psychiatry, 24(2), 113-120.

Smith-Romeril, C. (1983). Pediatric Utilization of Acute Care Hospitals in Alberta. Unpublished Masters Thesis. Division of Health Services Administration, University of Alberta.

Soderstrom, L. (1978) The Canadian Health System. Ltd.

Sohler, K.B. (1970). Role of alternative psychiatric services in Connecticut. Public Health Reports, 85(6), 510-515.

Sohler, K.B., & Thompson, J.D. (1970). Jarvis' law and the planning of mental health services. Public Health Reports, 85(6), 503-510.

Statistics Canada (1981). Mental Health Statistics: Volume I . Catalogue No. 83-204, Annual. Minister of Supply and Services Canada.

Statistics Canada (1981). One of Eight: Mental Illness in Canada. Publication No. Sa2-47, Minister of Supply and Services Canada.

Stern, M.S. (1977). Factors in the utilization of mental health centers and state hospitals. Hospital & Community Psychiatry, 28(5), 379-381.

Studnicki, J. (1975). The minimization of travel effort as a delineating influence for urban hospital service areas. International Journal of Health Services, 5(4), 679-693.

Taube, C.A. (1978). Assessing the supply of mental health resources. Statistical Notes for Health Planners, No.7. National Center for Health Statistics, Hyattsville, Md.

Toews, J., Pravhu, V., & El-Guevaly, N. (1980). Commitment of the mentally ill: Current issues. Canadian Journal of Psychiatry, 25(8), 611-618.

Toll, K.A. (1982). Hospital bed utilization by levels of care in Alberta. Unpublished Master's Thesis, Division of Health Services Administration, University of Alberta.

U.S. Department of Health and Human Services (1982). Vital and health statistics: Inpatient utilization in short-stay hospitals by diagnosis: United States ,1979. Washington,D.C.

Warheit, G.J., Holzer, C.E., Bell, R.A., & Arey, S.A. (1976). Sex, marital status, and mental health: A reappraisal. Social Forces, 55(2), 459-470.

Weissman, M.M., & Klerman, G.L. (1977). Sex differences and the epidemiology of depression. Archives of). Small area variations in health care delivery. Science, 182, 1102-1107.

Wilkinson, C.B., & O'Connor, W.A. (1982). Human ecology and mental illness. American Journal of Psychiatry, 139(8), 985-990.

Williams, J.I., & Luterbach, E.J. (1976). The changing boundaries of psychiatry in Canada. Social Science and Medicine, 10, 15-22.

Williams, S.J., & Richardson, M. (1980). Utilization of ambulatory mental health services. Administration in Mental Health, 7(4), 304-321.

Wilson, P., & Tedeschi, P. (1984).Community correlates of hospital use. Health Services Research, 19(3), 333-355.

Wolinsky, F.D., Coe, R.M., Miller, D.K., Prendegast, J.M., Creel, M.J., & Chavez, M.N. (1983). Health services utilization among the noninstitutionalized elderly. Journal of Health and Social Behavior, pp. 325-335.

Yates, T. (1982). Need for child psychiatrists in Calgary and Southern Alberta 1981-1990. Unpublished report, Department of Psychiatry and Paediatrics, Faculty of Medicine, University of Calgary.

APPENDIX A

List of Diagnosis Codes and Diagnostic Categories

Diagnostic Categories and Code Numbers

Diagnostic Category	ICD-9-CM	H-ICDA-2	H-ICDA
Psychoses	290.-299.9	296.0-307.9 Except 302.4	296.0-305.9 Except 302.4 and 304.9
Neuroses	300.0-300.9	310.0-310.9	310.0-310.9
Alcohol and Drug Disorders	303.0-305.9	313.0-314.9 302.4 Y63.0-Y63.4	313.0-314.9 302.4 304.9
Other Non-Psychotic Mental Disorders	301.0-301.9 302.0-302.9 306.0-316.8 Except 311.0, 317.0-319.9	311.0-311.9 312.0-312.9 315.0-318.9 290.0-295.9	311.0-311.9 312.0-312.9 315.0-318.9 290.0-295.9 319.3

APPENDIX B

Formula for Exponential Population Projections

Formula For Exponential Population Projections

Population estimates for intercensal years were derived using the following formula:

$$R = Exp\ (\ Ln\ (\ P_2\ /\ P_1\ )\ )\ /n$$

where:

R = rate of increase

P_1 = population for base year: 1971, 1976 or 1981

P_2 = population for boundary year

Ln = natural logarithm

Exp = exponent

n = number of years (units) of total increase

General hospital district populations were estimated for intercensal years using a compounding method:

$P\ (1972) = P\ (1971)\ X\ R_1$ $P\ (1977) = P\ (1976)\ X\ R_2$

$P\ (1973) = P\ (1972)\ X\ R_1$ $P\ (1978) = P\ (1977)\ X\ R_2$

$P\ (1974) = P\ (1973)\ X\ R_1$ $P\ (1979) = P\ (1978)\ X\ R_2$

$P\ (1975) = P\ (1974)\ X\ R_1$ $P\ (1980) = P\ (1979)\ X\ R_2$

$$P\ (1982) = P\ (1981)\ X\ R_3$$

APPENDIX C

Formula for Weighted Sum Method for Age-Sex Adjustments

Formula for Weighted Sum Method for Age-Sex Adjustment[1]

1. $$N._j = \sum_k W_k P_{kj}$$

where:

$N._j$ represented the age-sex adjusted number of residents in general hospital district j

P_{kj} represents the total number of residents in the kth age-sex group in hospital district j

W_k represents the age-sex adjusting weight of the kth age-sex group

2. $$W_k = \frac{Dk./Pk.}{D../P..}$$

where:

Dk. = patient days accounted for by the kth age-sex group

Pk. = number of persons in the kth age-sex group

D.. = total patient days (or separations admissions, other utilization measure) accounted for by all persons in the study area

P.. = total number of persons in the study area

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[1] Source: Bay, K. and Nestman, L. A hospital service population model and its application. International Journal of Health Services, 1980, 10(4), 677-695.

APPENDIX D

List of Hospital Districts, Hospitals, and Mental Health Care Regions

List of General Hospital Districts, Hospitals and Mental Health Care Regions

EDMONTON REGION:

HOSPITAL DISTRICTS	HOSPITALS
Edmonton	University of Alberta Royal Alexandra Misericordia Edmonton General Charles Camsell Glenrose Provincial Cross Cancer Institute
Grande Cache	Grande Cache General
Jasper	Seton General
Hinton	Hinton General
Edson	St. John's
Drayton Valley	Drayton Valley General
Stoney Plain	Stony Plain Municipal
Devon-Leduc	Leduc General Devon Civic
St. Albert	Sturgeon General
Ft. Saskatchewan	Ft. Saskatchewan General

CALGARY REGION:

HOSPITAL DISTRICTS	HOSPITALS
Calgary	Foothills Provincial Calgary General Holy Cross Rockyview General Colonel Belcher Salvation Army Grace Alberta Children's
Banff	Mineral Springs
Canmore	Canmore Municipal
Turner Valley	Turner Valley Municipal
Drumheller	Drumheller General
Wheatland	High River Hospital
Unorganized	

GRANDE PRAIRIE REGION:

HOSPITAL DISTRICTS	HOSPITALS
High-Level-Ft. Vermilion	High Level Community Health Centre St. Theresa General
Manning	Manning Municipal
Fairview	Fairview General
Berwyn	Berwyn Municipal
Peace River	Peace River Municipal
Spirit River	Central Peace General
McLennan	Sacred Heart
High Prairie	High Prairie Regional Health Complex
Slave Lake	Slave Lake General
Beaverlodge-Hythe	Beaverlodge Municipal
Grande Prairie	Grande Prairie General
Valleyview	Valleyview Health Centre
Whitecourt	Whitecourt General
Mayerthorpe	Mayerthorpe General
Barrhead	Barrhead General

FT. MCMURRAY REGION:

HOSPITAL DISTRICTS	HOSPITALS
Ft. McMurray	Ft. McMurray Hospital
Athabasca	Athabasca Municipal
Westlock	Immaculata
Redwater	Redwater General
Boyle	Boyle General
Lac La Biche	Lac La Biche General
Smoky Lake	George McDougall Memorial
Willingdon-Lamont-Mundare	Mary Immaculate (1) Archer Memorial Mary Immaculate (2)
Vilna	Our Lady's
Two Hills	Two Hills Municipal
Vegreville	St. Joseph's General
Glendon	Glendon Municipal
Bonnyville	St. Louis, Duclos
Cold Lake	John Neil
St. Paul	St. Therese General
Elk Point	Elk Point Municipal
Myrnam	Myrnam Municipal
Mannville	Mannville Municipal
Vermilion	Vermilion Health Complex
Islay	Islay Municipal
Lloydminster	

RED DEER REGION:

HOSPITAL DISTRICTS	HOSPITALS
Rocky Mountain House	Rocky Mountain House General
Breton	Breton General
Westaskewin	Wetaskewin General
Rimbey	Rimbey General
Ponoka	Ponoka General
Camrose	St. Mary's
Bentley	Bentley General
Eckville	Eckville Municipal
Tofield	Tofield Municipal
Viking	Viking General
Wainwright	Wainwright District Health Care Complex
Provost	Provost Municipal Health Care Centre
Bashaw	Bashaw General
Castor	Our Lady of the Rosary
Consort	Consort Municipal
Coronation	Coronation Municipal
Lacombe	Lacombe General
Stettler	Stettler General
Red Deer	Red Deer Regional Hospital Centre
Sundre	Sundre General
Innisfail	Innisfail Health Care Centre
Olds	Olds Municipal
Didsbury	Didsbury Municipal
Elnora	Elnora General
Trochu	St. Mary's
Three Hills	Three Hills Municipal
Hanna	Hanna General
Cereal	Cereal Municipal
Oyen	Big Country
Flaggstaff-Hughenden	Daysland General
	Killam General
	Galahad General
	Hardisty General

LETHBRIDGE REGION:

HOSPITAL DISTRICTS	HOSPITALS
Lethbridge	Lethbridge Regional St. Michael's General
Vulcan	Vulcan General
Claresholm	Claresholm General
Crowsnest Pass	Crowsnest Pass General
Pincher Creek	Pincher Creek Municipal
Ft. McLeod	McLeod General
Cardston	Cardston Municipal
Magrath	Magrath Municipal
Milk River	Border Counties General
Raymond	Raymond Municipal
Carmangay	Little Bow Municipal
Picture Butte	Picture Butte Municipal
Taber	Taber General

MEDICINE HAT REGION:

Hospital Districts	Hospitals
Medicine Hat	Medicine Hat and District General
Empress	Empress Municipal
Bassano	Bassano General
Brooks	Brooks Health Centre
Bow Island	Bow Island General

APPENDIX E

Formulae for Relevance and Commitment Indices

Formulae for Relevance and Commitment Indices

Hospital admissions, separations and patient days may be used in the following formulae.

1. Relevance Index (RI)

   1.1 RI of a District to a Hospital(s) located within that District

$$\frac{\text{Number of District Residents Separated from the District Hospital(s)}}{\text{Total Number of District Residents Separated from All Hospitals in the Province}} \times 100$$

   1.2 RI of a District to a Hospital(s) located outside that District

$$\frac{\text{Number of District Residents Separated from all Non-District Hospitals}}{\text{Total Number of District Residents Separated from All Hospitals in the Province}} \times 100$$

2. Commitment Index (CI)

   2.1 CI of a Hospital to the District in which that Hosital is located

$$\frac{\text{Number of District Residents Separated from a District Hospital}}{\text{Total Number of Provincial Residents Separated from that Hospital}} \times 100$$

   2.2 CI of a Hospital to all other Districts in the province other than its own

$$\frac{\text{Number of Non-District Residents Separated from a Hospital}}{\text{Total Number of Patients Separated from that Hospital}} \times 100$$